HORTICULTURAL ABSTRACTS

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Initialled abstracts and reviews, not by Bureau staff, are by E. E. Cheesman of the Agricultural Research Council, London, H. W. Miles of Wye College, R. H. Stoughton, Horticultural Department, Reading, R. J. Garner, N. H. Grubb, H. B. S. Montgomery, S. C. Pearce and H. M. Tydeman of the East Malling Research Station, Staff of the Obstbauversuchsring, Jork, Germany, and G. St. C. Feilden.

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N.B.—Numbers sub-divided alphabetically refer to items noted but not abstracted.

MISCELLANEOUS.

General.

2179. Livingston, A. E.
Horticulture and fruit-growing in the West of Scotland.
Scot. Agric., 1950, **30**: 47-51.

In the west of Scotland some 5,000 acres are under horticultural crops, not counting holdings less than one acre. Tomatoes, vegetables and small fruit are the most important crops, but flower cultivation is rapidly extending. Lanarkshire is Scotland's chief fruit-producing county, and with 200 acres of glasshouses it predominates also in tomato production. Ayrshire, next in importance, has extensive ranges of tomato houses, while Perthshire leads in raspberry culture. Market gardens in the west are, with few exceptions, of the small type. Auchincruive, near Ayr, is the main centre of horticultural interest with its many demonstration plots and with the trials planned by the College outside its own grounds. Some other experimental centres are briefly described and production figures are given.

2180. 4th International Congress of Soil Science.
A visit to the State Agricultural Institute of Ghent.
Coupure Links, Ghent, Belgium, 1950, pp. 20.

In this short, useful guide we find notes on the Department of Horticulture, Ghent, where all branches of horticulture are studied, and on the Department of Tropical Agriculture. On the research side should be noted: the Plant Breeding Research Station which includes medicinal plants, the Agricultural Economics Experiment Station, and the Horticultural Research Station. Dr. S. F. Cortvriendt, who directs both the last-named station and the Horticultural Department, is responsible for research on the raising of new varieties of ornamental plants, nutrient elements in horticulture, growth substances, water cultures, factors influencing plants (e.g. light, temperature, etc.) in the glasshouse, efficiency in horticultural practice.

2181. Baldacci, A.
L'Islanda nazione ortofrutticola utilizzando le sorgenti termali. **(The hot springs horticulture of Iceland.)**
Ital. agric., 1950, **87**: 364-71, bibl. 4, illus.

A general account is given of natural thermal activity in Iceland which shows itself in two main types of ebullition, namely that of alkaline water with a pH about 9, and that of sulphurous emanations of mud and steam in soils which are normally acid. The mud in such cases shows a pH of about 4. Details are tabulated for the number of hot springs which provide water at temperatures ranging from 28° to 97° C., most of them exceeding 50° C. The largest is that of Deildartunga, which yields 200-250 litres a second. By 1949 the water from such springs was utilized for heating not only houses and schools but also 58,000 m² of glasshouses and 79 fishponds, i.e. about five times the area heated by coal or electricity. The heat requirements of such glasshouses are about 10 kilocalories a second per 100 m². This figure satisfies winter's highest demands and corresponds to the demand of 0·5 l./sec. 90° C. water for a house of 300 m². The glasshouses are solidly built of cement with internal fittings of wood or iron. Some of those recently put up cover an area of 1,000 m². While citrus and bananas are grown and grapes are actually exported to northern markets, most of the produce consists of tomatoes and cucumbers, while close to Reykjavik and Akureyri flowers are also grown.

2182. Swanson, C. L. W.
Garden farming in Japan.
Reprinted from *Science Counselor*, March, 1950, pp. 3½, illus.

As agriculture in Japan is gardening rather than farming, yields per unit area are exceptionally high, though production per man-hour is low. Potatoes, sweet potatoes and vegetables are included in the discussion of Japanese methods and land resources. The increase in crop yields in Hiroshima and Nagasaki appears to be due chiefly to ash accumulation and partial sterilization of the soil to a depth of 4-6 in. rather than to the effect of radio-activity *per se*.

2183. TIÈCHE, J.
Jardin botanique alpin " Florealp ", Champex. (The alpine botanical garden Florealp, Champex [Switzerland].)
Rev. hort. suisse, 1950, **23**: 257-60.
An illustrated description of the ¾-hectare botanical garden which is situated in French-speaking Switzerland at an altitude of 1,475 m. and contains over 4,000 species.

2184. KOBUSKI, C. E.
Alfred Rehder. 1863-1949.
J. Arnold Arbor., 1950, **31**: 1-38.
A short account of the life of this eminent horticulturist is followed by lists of (1) genera and species named for Professor Rehder in recognition of his work, and (2) his publications issued in each year from 1883 to 1949 inclusive. Born in 1863 in Saxony, he emigrated to America in 1898, becoming an American citizen in 1904.

2185. (ROYAL SOCIETY.)
General notes on the preparation of scientific papers.
Published for the Royal Society by the Cambridge University Press, London, 1950, pp. 26, 2s. 6d.
This brochure is commended most heartily for general use by those writing papers. It does not suggest any great change in normal procedure, but it does bring together clearly and concisely those rules, the observation of which will facilitate the work of the printer and help the reader to appreciate the article. Advice is given on footnotes [not popular], title and headings, numerical results, references [Harvard and numerical systems], tables, illustrations, nomenclature symbols and abbreviations, proof corrections, synopses.

2186. PRESTON, A. P.
Weather conditions during 1949.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 80-1.
The year was exceptionally dry and sunny and the serious water shortage adversely affected top fruit crops. Serious late spring frosts were absent. The establishment of a crop weather station at Throwley, Kent, as a sub-station of East Malling, is announced; it is situated in a young top fruit plantation 500 ft. above sea level.

Statistical design.

2187. PEARCE, S. C., AND TAYLOR, J.
The purpose and design of calibration trials.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 83-90, bibl. 19.
An account is given of (1) the purpose and value of calibration trials, (2) design of orchards for calibration trials, and (3) the calibration of commercially planted trees. It is recommended that experimental trees should be planted as soon as possible, even before treatments are decided upon, so as to obtain knowledge of the individual potentialities before the application of treatments. By means of this preliminary " calibration ", the variability of results can often be reduced. The laying out of orchards for calibration is discussed and descriptions are given of two designs (the " stripe " and the " tile ") suitable for trials with several varieties. The calibration of commercially planted trees is also discussed.

2188. PEARCE, S. C.
The interpretation of uniformity trials.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 91-2.
Some general recommendations are made for the interpretation of uniformity trial data relative to the variability in the yields of irrigated vines in Argentina. [See also *H.A.*, 19: 937.]

2189. TAYLOR, J.
A valid restriction of randomization for certain field experiments.
J. agric. Sci., 1949, **39**: 303-8, bibl. 4.
Two examples are given of field trials—an apple trial in a plantation designed for subsequent thinning, and raspberry variety trials—for which randomized blocks would seem the most suitable design, but in which special considerations of the future of the trial or the nature of the treatments make complete randomization impossible or impracticable. A type of design which takes account of these difficulties is described, together with the appropriate methods of analysis.—East Malling Research Station.

2190. BAKER, R. E., AND BAKER, G. A.
Experimental design for studying resistance of strawberry varieties to verticillium wilt.
Phytopathology, 1950, **40**: 477-82, bibl. 6.
Data on the resistance of strawberry varieties as measured by a rating system applied to plants grown under field conditions have been obtained in the form of two uniformity trials on two varieties (Shasta and Lassen), and a randomized block experiment with 27 varieties and 4 replications. It is found that: There is less variation if the plots are taken across rows instead of with rows: plots of 50 plants seem to be fairly adequate; the variance of a plot depends on variety and location; the means of plots within a block depend on variety and location; the observed error variance is ten times as large as expected for straight analysis of variance of average ratings of plots of 50 plants for the randomized block trial.—Agric. Exp. Stat., Davis, California.

2191. RIGNEY, J. A., MORROW, E. B., AND LOTT, W. L.
A method of controlling experimental error for perennial horticultural crops.
Proc. Amer. Soc. hort. Sci., 1949, **54**: 208-12, bibl. 3.
The advantages of the analysis of covariance for minimizing experimental error are pointed out. It is not necessary to delay the application of treatments until yield records have been taken, since it is usually possible to find other measurements that can be made at once and yet be satisfactory. This is illustrated for blueberries and grapes. [This paper can usefully be read in conjunction with that by Pearce; see abstract 2187.] S.C.P.

Biochemistry.

(*See also* 2355-2361, 3012, 3096, 3239, 3363m, 3365, 3388, 3389, 3390h, j.)

2192. RUBIN, B. A., AND ARCHOVSKAJA, E. V.
The role of saccharose in carbohydrate exchange in plants.
Doklady Akad. Nauk S.S.S.R., 1948, **60**: 841-3 [received 1950].

From the results recorded for Jerusalem artichoke, chicory, wheat and onion, it is considered probable that, in the higher plants, the synthesis of polysaccharides is an intermediate stage in the formation of saccharose.

2193. BONNER, J.
The role of toxic substances in the interactions of higher plants.
Bot. Rev., 1950, **16**: 51-65, bibl. 41.

More recent evidence for the existence of substances in plants inimical to other plant life is noted. Growth inhibitors have been shown to be contained in the roots of peach, brome grass, *Robinia* and black walnut, but the mechanism of their action and their effect is still unknown. The cases of leaf toxins in *Encelia farinosa* and *Artemisia absinthium*, and root toxin in guayule are examined in detail, the latter appearing to be of no economic importance. The effects of the toxins in *Encelia* and *Artemisia* on the floristic composition of their habitats are described, and the author suggests that other desert shrubs may, like *Encelia*, produce similar toxic substances. [From author's summary.]—Institute of Technology, Pasadena, California.

2194. CHRISTIANSEN, G. S., AND THIMANN, K. V.
The metabolism of stem tissue during growth and its inhibition. I. Carbohydrates. II. Respiration and ether-soluble material.
Arch. Biochem., 1950, **26**: 230-47, bibl. 23, and 248-59, bibl. 13.

The investigation was carried out at Harvard University on isolated sections of stems of etiolated pea seedlings.

2195. THIMANN, K. V., AND BONNER, W. D., Jr.
Organic acid metabolism.
Annu. Rev. Plant Physiol., 1950, **1**: 75-108, bibl. 216.

The extensive literature of the last 10 years is reviewed, attention being concentrated on the organic acids themselves and their occurrence and role in katabolism and growth in plants. Brief consideration is given to new techniques for the determination and separation of organic acids. Considerable information has been accumulated on the organic acids of leaves, but studies on the biochemistry of organic acid formation and metabolism in fruits have been regrettably few in number. Transamination and amide formation, the metabolism of individual acids, participation in respiration, and the relationship between organic acid metabolism and growth are discussed. To cover the many miscellaneous observations on the occurrence of organic acids, the data are presented in tabular form for each acid separately under the headings of plant, material, remarks, and reference, which should provide a useful index to the scattered literature.

2196. HASSID, W. Z., AND PUTMAN, E. W.
Transformation of sugars in plants.
Annu. Rev. Plant Physiol., 1950, **1**: 109-24, bibl. 55.

The literature is reviewed under the following headings: The first sugar of photosynthesis, interconversion of monosaccharides, mechanism of interconversion of monosaccharides, mechanism of sucrose synthesis, relation of sucrose phosphorylase to polysaccharide synthesizing enzymes, synthesis of starch, and formation of pentoses.

2197. SAÏD, H., AND EL-SHISHINY, E. D. H.
The effect of temperature on respiration and nitrogen metabolism of radish root slices.
Reprinted from *Bull. Fac. Sci. Fouad I Univ.* 1948, No. 27, pp. 1-22, bibl. 20.
SAÏD, H., AND KHALIL, A. I.
Respiration and nitrogen metabolism of radish root slices immersed in water, sugar and glycine solutions.
Reprinted from *Bull. Fac. Sci. Fouad I Univ.* 1948, No. 27, pp. 23-39, bibl. 43.

In the first of these experiments on sliced radish roots, 35° C. was found to be more favourable than 15° or 25° C. for ammonium and nitrate assimilation and protein synthesis. Nitrate ions were more readily absorbed and assimilated than ammonium ions in presence of a high level of sugar at all three temperatures.

In the second experiment tissues fed with glycine and glucose, either separately or together, showed much higher respiration rates than control samples in water. Glucose feeding always accelerated nitrate reduction and protein synthesis, but when glycine was supplied as well as glucose, both processes were retarded, particularly when a higher concentration of glycine was used.

2198. PORTER, J. W., AND LINCOLN, R. E.
I. *Lycopersicon* selections containing a high content of carotenes and colorless polyenes. II. The mechanism of carotene biosynthesis.
Arch. Biochem., 1950, **27**: 390-403, bibl. 24, being *J. Pap. Purdue Univ. agric. Exp. Stat.* **427.**

By crossing *Lycopersicon* species and then inbreeding and selecting, selections have been developed, which contain much higher amounts of carotenes and colourless polyenes than ordinary commercial tomato varieties. It is suggested that the method used in the development of the selections may be of general value in the elucidation of biosynthetic mechanisms. The superiority of this method to the mutation method in the study of certain biosynthetic mechanisms is also suggested. A scheme for the biosynthesis of carotenes in tomatoes is presented. The order of the compounds in the biosynthetic scheme has been established on the basis of chemical structure. Evidence for the direction of the reactions has been supplied by studies on the inheritance of key compounds in the scheme. Three types of reaction are involved in the postulated scheme: dehydrogenation, ring formation and oxidation. It is suggested that the postulated scheme is probably valid for all yellow and red, carotene-containing fruits and vegetables. The scheme

may or may not be valid for green leaves. The detection of tetrahyphytoene in green leaves may possibly validate the scheme. [From authors' summary.]

2199. SEYBOLD, A., AND BÜHLER, H.
Bestimmung des Phosphorgehaltes plasmo- und chymochromer Blumenblätter. (The determination of the phosphorus content in plasmochrome and chymochrome petals.)
Biol. Zbl., 1950, **69**: 226-8, bibl. 6.
Plasmochrome (containing chromatophores) petals were found to have a higher phosphorus content than chymochrome (without chromatophores) petals.—Heidelberg University.

2200. ERMOLAEVA, E. JA., AND ŠČEGLOVA, O. A.
Anthocyanin and plant development. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1948, 60: 901-3 [received 1950].
Results obtained with *Perilla ocymoides* and *P. nankinensis* indicate that as plants pass from the vegetative to the reproductive phase there is a sharp fall in the amount of anthocyanin, resulting in its complete disappearance in *P. ocymoides*. It is concluded that the appearance and disappearance of anthocyanin in the leaves of *P. ocymoides*, and its quantitative change in *P. nankinensis*, may serve in some degree as a criterion of the phase of development of the plant.

2201. LATIES, G. G.
An oxidative, cyanide-insensitive enzyme system in the chloroplasts of a higher plant.
Arch. Biochem., 1950, **27**: 404-9, bibl. 5.
Spinach leaves rapidly frozen with solid carbon dioxide, or homogenized directly to the cell-free state, were shown to exhibit a cyanide-insensitive gas exchange with an R.Q. of 1·4 or greater. [From author's summary.]—Calif. Inst. Technol., Pasadena.

2202. GAGE, T. B., GALLEMORE, C., AND WENDER, S. H.
Chromatographic adsorption studies on certain flavones.
Proc. 37th annu. Mtg Okla Acad. Sci. for 1948, 1950, pp. 71-3, bibl. 3.
In studies on the chromatographic behaviour of quercetin, quercitrin, rhamnetin, xanthorhamnin, homoeriodictyol, D-catechin, rutin and naringin, three adsorbents, namely barium sulphate, magnesol and silica gel, proved more satisfactory than talc, florisil or alumina. Evidence of impurities was noted in most of the flavonoid pigments.

2203. GAGE, T. B., DOUGLASS, C. D., AND WENDER, S. H.
The purification and quantitative estimation of quercetin by paper partition chromatography.
Proc. 37th annu. Mtg Okla Acad. Sci. for 1948, 1950, pp. 64-7, bibl. 3, illus.
A micro method of quantitatively estimating the amount of flavonoid pigment in a plant extract has been proposed. The method involves the separation of the flavonoid pigment from other impurities by paper partition chromatography, the quantitative removal of the purified pigment from the filter paper by leaching with ethyl alcohol, and the determination of the amount of flavonoid pigment by means of the Beckman DU spectrophotometer. The successful application of the procedure to quercetin has been described, and the presence of an interfering material has been noted. [Authors' summary.]

2204. STEWARD, F. C., AND THOMPSON, J. F.
The nitrogenous constituents of plants with special reference to chromatographic methods.
Annu. Rev. Plant Physiol., 1950, **1**: 233-64, bibl. 206.
A bibliography of papers on the nitrogen compounds of plants published since 1946, including papers in cognate fields, comprises some 2,000 titles. Various aspects of the subject are already covered by existing reviews, and the present one is therefore selective, " the purpose being to give the reader a preview of the future, rather than a review of the past, by considering topics which seem to indicate the trends to be followed in the future ". The aspects to which particular attention is paid are: nitrogen compounds in relation to the cycle of growth and development, paper chromatography in the identification of nitrogen compounds, metabolic relations of amino acids and amides, other components of the soluble nitrogen fraction, and peptides, proteins and their synthesis.

2205. WESTALL, R. G.
The use of ion-exchange resins for the isolation of glutamine and other nitrogenous substances from beetroot.
J. Sci. Fd Agric., 1950, **1**: 191-3, bibl. 16.
The method for the isolation of amino-acids and organic bases by displacement chromatography using synthetic ion-exchange resins[1,2] has been employed for fractionating the nitrogenous bases in a beetroot extract. Pure glutamine has been isolated from selected fractions and treatment of other fractions has led to the isolation of betaine and γ-aminobutyric acid. [Author's abstract.]—Low Temperature Station for Research in Biochemistry and Biophysics, Cambridge.

2206. TITAEV, A. A.
Thiamindehydrase, its properties, distribution and function. [Russian.]
Biohimija (Biochemistry), 1950, **15**: 236-42, bibl. 1.
The ferment thiamindehydrase is widely distributed in those organs of animals and plants where there is intense metabolism, or where metabolic products concentrate. The thiamindehydrase contents of various wild and cultivated plants (potato, sunflower, tomato, apple) are tabulated.

Physiology and photoperiodicity.

(*See also* 2222, 2223, 2855, 2857, 2864, 2894, 3053u, 3096, 3127, 3182, 3365.)

2207. FREY-WYSSLING, A.
Physiology of cell wall growth.
Annu. Rev. Plant Physiol., 1950, **1**: 169-82, bibl. 59.

This review covers the period from about 1935 to 1949, and the approach to the subject may be indicated by reference to the headings used, namely: morphology, growth in surface, tip growth of cells, spiral growth, dynamics and energetics of cell elongation, and metabolism during cell elongation.

2208. GODDARD, D. R., AND MEEUSE, B. J. D.
Respiration of higher plants.
Annu. Rev. Plant Physiol., 1950, **1**: 207-32, bibl. 265.

For the purpose of this review, which deals primarily with literature published since 1946, the term respiration is defined as " the oxidation of organic compounds with molecular oxygen serving as the ultimate electron acceptor; the oxidation may be complete with water and carbon dioxide as the final products, or it may be incomplete, with organic acids as the end products ". The subject is covered under the following headings: Respiratory substrates, Pasteur effect, mobilization of electrons, the release of carbon dioxide, relation to developmental stages, growth and respiration, salt respiration and ion absorption, fat and protein oxidation, and environmental factors.

2209. KRAMER, P. J., AND CURRIER, H. B.
Water relations of plant cells and tissues.
Annu. Rev. Plant Physiol., 1950, **1**: 265-84, bibl. 119.

This review deals principally with the nature of the forces causing the movement of water into and out of plant cells and tissues, and does not cover such processes as transpiration and the ascent of sap which concern the water relations of the entire plant. After briefly considering the classical concept of cell water relations and suggestions made for clarifying the rather confused terminology, the authors consider in some detail the water balance in plant cells, evidences of active or non-osmotic absorption, and the permeability of cell membranes to water.

2210. HAINES, F. M.
The relation between cell dimensions, osmotic pressure and turgor pressure.
Ann. Bot. Lond., 1950, **14**: 385-94, bibl. 10.

It is shown that the relation between cell extension and turgor pressure for isotropic cells is not linear but hyperbolic. Moreover, in calculating osmotic pressures of saps at different cell extensions it is important to use the ratios of volumes of the vacuoles only and not those of whole cells or blocks of tissue. Recalculations from existing data show the profound effect of taking these principles into account. In particular Lyon's data are shown to provide no evidence for a non-osmotic force in potato tubers.

2211. SCHRANK, A. R.
Plant tropisms.
Annu. Rev. Plant Physiol., 1950, **1**: 59-74, bibl. 62.

In a review of research work done during the past 10 years relevant papers are considered, with some unavoidable overlapping, according to the type of energy used in stimulation, namely phototropism, geotropism, plagiotropism, thigmotropism and electrotropism. Particular consideration is given to the mechanism that controls, or accounts for, the unequal distribution of auxin throughout the organ concerned, and the precise relationship between auxins and growth, already reviewed by other authorities elsewhere, is not discussed in detail. Increasing evidence has accumulated to show that an unequal distribution of auxin is a necessary step in all the tropisms, but it remains to be determined how this unequal distribution arises. In phototropism, attention has been directed to the role of photo-destruction of auxin and also to the fact that illumination in some instances alters the rate of auxin synthesis, but majority opinion still favours the lateral transport of auxin as the responsible factor, with, however, little information to identify the directing mechanism. In the other tropisms the transport of auxin remains almost the only suggested method to account for its unequal distribution. A correlation force to explain this transport has not been definitely established, but experiments are cited which suggest that the inherent electrical field could be the fundamental mechanism providing the role of the required oriented forces for the Cholodny-Went theory of tropisms.

2212. D'ARAGONA, G. G.
Ricerche sulle influenze dei campi elettromagnetici e dei raggi X sui tropismi dei vegetali. **(Investigation on the effects of electromagnetic and X-ray treatment on plant tropisms.** [English summary ½ p.]
Ann. Sper. agrar., 1949, **3** (N.S.): 1081-1100, bibl. 12.

At the Institute for Fruitgrowing and Electrogenetics near Rome the author treated the young growing points of *Centaurea americana*, *Ipomoea japonica* var. *coerulea*, *Helianthus annuus* var. *nanus*, *Solanum lycopersicum*, *Brassica campestris* var. *rapa* and *Triticum vulgare*. After treatment the plants were placed in a horizontal position and began orthotropic curving. He found that low frequency electromagnetic treatments in particular accelerated such curving and that high frequency and X-ray treatments delayed the onset of orthotropic curving and caused the bend to be less marked.

2213. LEVINE, M.
Plant-tissue culture technique from the mycological viewpoint.
Trans. N.Y. Acad. Sci. Ser. II, 1949, **12**: 2: 63-6, from abstr. in *Rev. appl. Mycol.*, 1950, **29**: 355.

The results of experiments at the Montefiore Hospital, New York, showed that meristematic tissue of higher plants, e.g. carrot, tobacco, sunflower, Jerusalem artichoke [*Helianthus tuberosus*], parsnip, salsify, and kohlrabi, can be grown on a pure synthetic medium to form tissue cultures with an unlimited capacity for proliferation. Tissue cultures of carrot tap-root and stem segments of *Nicotiana langsdorffii* and *N. affinis* yielded completely differentiated plantlets. Cytological studies of the tissue masses and some carrot plantlets, following growth on the chemical carcinogens 1,2,5,6-dibenzanthracene, 3,4-benzpyrene, and 20-methylcholanthrene, revealed structures not unlike those induced by crown gall (*Phytomonas* [*Bacterium*] *tumefaciens*).

2214. DORMER, K. J.
A quantitative study of shoot development in *Vicia faba*. 1. The xylem of the plumule.
Ann. Bot. Lond., 1950, **14**: 421-34, bibl. 5, illus.

This paper is the first of a series dealing with the part played by the leaf in the development of the trace bundles connected with it. As a preliminary to later defoliation experiments, the normal growth of the primary vascular system of the plumule of *Vicia faba* is studied. The investigation is not carried beyond the point at which the interfascicular cambium begins to contribute to the xylem. It was found that, while an internode is still elongating, its vascular differentiation is related to that of the internode below in a manner which is essentially the same for all internodes. After an internode ceases to elongate, the further elaboration of its xylem depends on its position in the stem, the lower internodes showing a stimulation which is not evident in the higher ones. This stimulation may be due to the presence of reserve substances in the cotyledons. Relative to the vascular differentiation of the internode, the leaf traces develop more rapidly in the fourth and fifth internodes than in those above or below. The higher the leaf, the greater is the tendency for the development of the upper part of its trace to lag behind that of the lower part. The time of unfolding of a leaf bears no fixed relationship to the development either of its own traces or of the internode which bears it. The higher the leaf, the smaller is the number of vessels in its median trace at the time when the leaf unfolds. The period immediately following the unfolding of the eighth leaf appears to be of special significance in the life of the plumule. At about this time the first multifoliolate leaves and the first flower buds appear. It is likely that this is the time at which the plant becomes fully independent of the cotyledonary reserves.—University of Nottingham.

2215. JACOBS, W. P.
Auxin-transport in the hypocotyl of *Phaseolus vulgaris* L.
Amer. J. Bot., 1950, **37**: 248-54, bibl. 20, illus.

In a series of experiments on seedlings of Red Kidney beans, an attempt was made to correlate the differentiation of physiological characteristics with the differentiation of morphological and anatomical characteristics. When the ability of hypocotyl sections to transport synthetic auxin was tested, it was found that in no case could any auxin be transported in a root-toward-shoot direction. At the top of the nearly mature (" 8-day ") hypocotyl, a very large amount of applied auxin could be transported through the section in a shoot-toward-root direction. At successively lower levels in the hypocotyl, successively less of the applied auxin was transported. This steady decrease in the strength of the polarity of auxin transport along the axis of the hypocotyl is in marked contrast to the more obvious morphological and anatomical characteristics, which show a very localized shift at the base of the hypocotyl. The ability of the tips of the hypocotyls to transport auxin in a shoot-toward-root direction first appeared between the 3-day and the 5-day stages. The amount of auxin transported per unit time through a section of unit length steadily increased between the 5-day and 8-day stages. No polarity of diffusible auxin was found at any age or at any level in the hypocotyl. The amounts of diffusible auxin collected were small and relatively constant. The hypothesis that the initial differentiation of the root in the proembryo is the indirect result of a pre-existing polar auxin-transport, is not supported by the data presented here. [Author's summary.]—Princeton University, N.J.

2216. WHALEY, W. G., RABIDEAU, G. S., AND MOORE, E. J.
The growth and metabolism of excised roots in culture. I. The measurement of growth and the role of certain vitamins.
Plant Physiol., 1950, **25**: 322-33, bibl. 22, illus.
RABIDEAU, G. S., AND WHALEY, W. G.
Idem. II. The respiratory rates of excised tomato roots.
Plant Physiol., 1950, **25**: 334-9, bibl. 11.

Methods were evolved for determining volume changes of excised roots grown in culture. Roots of the tomato, University of Texas laboratory line 151, grew best in White's solution with sucrose and glycine, supplemented with thiamin, niacin and pyridoxine. They grew least in the absence of all these vitamins. The data indicate that line 151 roots require thiamin and niacin or pyridoxine for growth, and suggest complementary action of thiamin and either niacin or pyridoxine. In cultures which showed visible growth the respiration rate was significantly higher than that of cultures in which there was no visible growth. Decrease in respiration rate accompanied aging of the cultures.—University of Texas, Austin, and the Clayton Foundation for Research.

2217. STOCKER, O.
Probleme der pflanzlichen Dürreresistenz.
(Problems of drought resistance in plants.)
Ber. wiss. Biol., 1950, **67**: 370.

Plasmatic and constitutional drought resistance are discussed and it is shown that the lethal point varies with temperature, season and other environmental factors. It is possible both to harden plants and to render them drought susceptible by a short and an abundant supply of water respectively. As the water potential of the plasm increases, the ratio photosynthesis : respiration shifts in favour of the latter. The aim should be a relative reduction in transpiration and a relative increase in the accumulation of carbohydrates. O.J.

2218. PARKER, M. W., AND BORTHWICK, H. A.
Influence of light on plant growth.
Annu. Rev. Plant Physiol., 1950, **1**: 43-58, bibl. 47.

This paper, in which work done between 1944 and 1949 is reviewed, is concerned mainly with the mechanism that is apparently common to photoperiodic regulation of flowering, formation of storage organs, abscission of leaves, coloration of foliage and various other morphological changes. It discusses photoreactions controlling flowering in several different plants, but does not attempt to cover other aspects of photoperiodism, such as the interaction of various environmental factors with photoperiod. It reviews growth responses of etiolated plants that are controlled by the

photoreaction operative in the photoperiod response and discusses several other plant responses for which the mechanism of light control has not yet been determined. It also includes a brief discussion of artificial light sources suitable for plant growth, none of which has yet proved wholly satisfactory.

2219. Parker, M. W., Hendricks, S. B., and Borthwick, H. A.
Action spectrum for the photoperiodic control of floral initiation of the long-day plant *Hyoscyamus niger*.
Bot. Gaz., 1950, **111**: 242-52, bibl. 7.
The action spectra for the photoperiodic control of flowering of one long-day and two short-day plants [see *H.A.*, 16: 351 and 19: 747] were so similar that it was tentatively concluded that the first step in photoperiodic control of flowering was the same for long- and short-day plants. This conclusion was confirmed by a determination of the action spectrum of another long-day plant, *Hyoscyamus niger*. Similarity of the action curve in this plant to the absorption of phycocyanin was noted, and the possibility that the effective pigment for the photoperiodic reaction might be some type of straight-chain tetrapyrrole was pointed out.—Beltsville, Md.

2220. Lona, F.
Dominare i fenomeni di fioritura. **(Regulating flowering phenomena.)**
Humus, 1950, No. 4, pp. 6-10, illus.
An account of the effect of photoperiodic variations from the normal on flowering, with illustrations of *Urtica*, *Chenopodium*, *Perilla* and *Chrysanthemum*.

2221. Henderson, C. W. W.
Increasing winter growth of *Bryophyllum calycinum*.
Gdnrs' Chron., 1950, **128**: 6-7.
For some years the leaves of *Bryophyllum calycinum* have been required for the purpose of physiological studies on acid metabolism. To maintain a good supply of leaves during the winter a batch of cuttings rooted in boxes was set out in a greenhouse under strong artificial light. The illuminated plants grew vigorously, providing several cuttings of leaves, while control plants kept under normal winter conditions did not produce leaves until the spring.

Photosynthesis.

(*See also* 2232.)

2222. Tombesi, L.
Fotosintesi, respirazione e traspirazione in funzione del regime idrico. **(Photosynthesis, respiration and transpiration as a function of water supply.** [English summary ½ p.]
Ann. Sper. agrar., 1949, **3** (N.S.): 759-76, bibl. 5.
The author studied, at the Agricultural Chemistry Research Institute at Rome, the influence of the amount of water supply on photosynthesis, respiration, transpiration and on the lignification of cell walls in *Solanum lycopersicum*. He discusses his results here. [See also next abstract.]

2223. Tombesi, L.
Fotosintesi, quoziente respiratorio, traspirazione, attività catalasica ed ossidasica di alcune specie vegetali in rapporto alle disponibilità idriche del suolo. Nota I e Nota II. **(Photosynthesis, respiratory quotient, transpiration, catalase and oxidase activity of certain plants in relation to soil water availability. I and II.)** [English summaries 1 page.]
Ann. Sper. agrar., 1950, **4** (N.S.): 481-510, 511-35, bibl. 20.
The author describes experiments initiated at the Stazione Chimico-Agraria Sperimentale at Rome in 1946. He gives details of his experimental material, media and apparatus. The material was *Solanum lycopersicum*, *Vitis vinifera*, *Vicia faba*, *Arachis hypogaea* and *Phaseolus vulgaris*. In the first part of the work results indicate that under certain experimental conditions transpiration activity increases in plants suffering from water deficiency. Continued trials confirmed this finding. It was shown, moreover, that the respiratory quotient increases in the tissues of plants grown in water deficiency and is greater in the morning than in the afternoon. Further work proved that oxidase content increases and catalase decreases during the period of growth; that oxidase activity is markedly superior in the tissues of plants grown in water deficiency ; and that enzymatic activity increases in the afternoon. No variation was observed in catalase activity. These facts indicate that the increase in respiratory and photosynthetic activities in plants grown under a water deficiency regime is related to oxidase activity.

2224. Vasiljeva, Z. V., and Kurganova, M. I.
A comparison of the photosynthetic intensity in aconite and French bean. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **72**: 961-3, bibl. 8.
Photosynthesis intensity in *Aconitum flerovii* was about double that of *Phaseolus vulgaris* over the same period and under the same conditions. This is said to confirm previous work by Blagoveščenskii showing that the phylogenetically younger plants have a higher energy potential than plants phylogenetically older.

Morphology.

(*See also* 2214, 3059.)

2225. Konovalov, I. N., and Artjušenko, Z. T.
The distribution of the vascular bundles of the flower in relation to floral structure. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1949, **69**: 449-52, bibl. 5.
Descriptions and illustrations of the floral structure and distribution of the vascular bundles in buttercup (*Ranunculus acer*), wild strawberry (*Fragaria vesca*), herb bennet (*Geum urbanum*), dandelion (*Taraxacum officinale*), tea rose (*Rosa chinensis*), dog-rose (*Rosa canina*), fig (*Ficus carica*) and opuntia (*O. sulphurea*).

2226. Scott, F. M.
Internal suberization of tissues.
Bot. Gaz., 1950, **111**: 378-94, bibl. 24, illus.
An anatomical study of a wide range of plant species has shown that the internal surface of tissues, i.e. the

entire system of intercellular spaces in leaf, stem, root, flower and fruit, is lined by a suberin lamella. The inner surface of all cell walls is also lined by a more tenuous pellicle of apparently similar material which is distinct from the plasma membrane. The degree of internal suberization varies in xerophytes, mesophytes and hydrophytes and in tissues of different age. The external surface of developing root hairs in *Vicia faba* and in *Ricinus communis* is coated with a varnish-like film resistant to H_2SO_4 and in other respects indistinguishable from the intercellular and intracellular fibres of the root cortex and tissues of the stem and leaves of the same plants. It is pointed out that the significance of internal suberization must be considered in future physiological discussions of such problems as transport of solutes, permeability, respiration, fat metabolism and transpiration.—University of California, Los Angeles.

Radioactive materials.

(*See also* 2648.)

2227. Alexander, L. T.
Radioactive materials as plant stimulants—field results. (Summary.)
Agron. J., 1950, **42**: 252-5.

Preliminary trials in Illinois, Washington, N. York, Michigan and other states on cereals and a number of vegetables gave negative results.

2228. Burris, R. H.
Isotopes as tracers in plants.
Bot. Rev., 1950, **16**: 150-80, bibl. 161.

The sphere in which both radioactive and stable isotopes are most suitable are defined, and the types of problem for which they offer promise of solution are described. The results of the use of C^{11}, C^{14} and O^{18} in investigating photosynthesis, and N^{15} in nitrogen fixation, are given. Work with P^{32} on phosphorus distribution in tissues and the effect of tobacco mosaic virus are mentioned, and the value of I^{131} in tracing the movement of herbicides in plants is stressed. Claims made for the stimulation of plant growth by radioactivity are noted, but are stated to need verification.—University of Wisconsin.

2229. Melin, E., and Nilsson, H.
Transfer of radioactive phosphorus to pine seedlings by means of mycorrhizal hyphae.
Physiol. Plant., 1950, **3**: 88-92, bibl. 9.

It has been shown that the fungal symbiont *Boletus variegatus* is able to transfer phosphorus to pine roots.—Uppsala University.

2230. Holley, R. W., Boyle, F. P., and Hand, D. B.
Studies of the fate of radioactive 2,4-dichlorophenoxyacetic acid in bean plants.
Arch. Biochem., 1950, **27**: 143-51, bibl. 12, being *J. Pap. N.Y. St. agric. Exp. Stat.* **823.**

Carboxyl-labelled radioactive 2,4-dichlorophenoxyacetic acid (2,4-D) has been synthesized and applied to red-kidney bean plants. The distribution of radioactive carbon in the plants at various times after application of 2,4-D to the leaves indicates that the chief movement of radioactive carbon is downward in the stems. Radioactive carbon is lost from the plants as carbon dioxide and is also lost to the nutrient solution. [From authors' summary.]

2231. Vlamis, J., and Pearson, G. A.
Absorption of radioactive zirconium and niobium by plant roots from soils and its theoretical significance.
Science, 1950, **111**: 112-13, bibl. 9.

Carrots grown for 8 weeks in soil to which radioactive Zr and Nb had been added showed high radioactivity in their roots and weak activity in their shoots. From this evidence of absorption and from a soil leaching experiment with organic acids, it is concluded that the CO_2-soil solution theory does not offer a satisfactory explanation of the mechanism of release of adsorbed ions in so far as the absorption of radioactive Zr and Nb is concerned. The only possible mechanisms are offered by the contact theory or by a soil solution theory postulating the excretion of organic acids by plant roots or micro-organisms growing in the same environment.—Univ. Calif., Berkeley.

2232. Benson, A. A., and Calvin, M.
Carbon dioxide fixation by green plants.
Annu. Rev. Plant Physiol., 1950, **1**: 25-42, bibl. 68.

This review is primarily concerned with research based on tracer carbon in the period from June 1947 to November 1949, but the classical methods of gross analysis are also briefly discussed. The subject is considered from the standpoints of the effect of growth conditions on assimilation, the absorption of carbon dioxide by isolated chloroplasts, the metabolism of added intermediates, the intermediates of carbon dioxide reduction, the carbon dioxide fixation cycle, and the dark fixation of carbon dioxide. Since the long-lived isotype of carbon, C^{14}, became available and has been applied in the study of photosynthesis, research on all aspects of photosynthesis has expanded. In their conclusions the authors state that it is clear that, with the development of the tracer method for following carbon in plant metabolism, the means for determining the detailed and manifold reactions through which carbon passes into the structure of plants is at hand. However, it is not to be expected that this type of work will lead directly to a solution of the unique problems of photosynthesis, namely, the knowledge of the act or acts by which electro-magnetic energy is transformed into chemical energy. The solution of this problem is more likely to be found in investigations of the photochemical production of oxygen by isolated chloroplasts (grana) in the presence of suitable oxidizing agents.

Growth substances.

(*See also* 2211, 2215, 2256, 2344, 2352, 2378-2380, 2414, 2432-2439, 2675, 2691, 2695, 2865-2869, 2972, 3014, 3130, 3190, 3213, 3214, 3226, 3249.)

2233. Mitchell, J. W., and Marth, P. C.
Growth regulating substances in horticulture.
Annu. Rev. Plant Physiol., 1950, **1**: 125-40, bibl. 130.

In this review an attempt is made to present some of the new ideas, theories and results that have developed from recent research on plant growth-regulating substances. The work covered was done mainly in

the last five years and is limited almost exclusively to the U.S.A. Aspects considered are the absorption and translocation of growth substances, vegetative propagation, fruit growth and maturation, the effect of growth-regulating substances on flower abscission and fruit set, their effect on retarding fruit drop, their effect on dormancy, and various other responses.

2234. v. STOKAR, —.
Das Problem der Wuchsstoffe. (The problem of growth substances.)
Dtsch. Baumsch., 1950, **2**: 122-3, 125.
The most popular growth substances are listed and discussed. The method of application most suitable for nursery practice is dipping the roots in growth substance solution, length of dip depending on the concentration of solution and woodiness of the roots. The author discusses the advantages and disadvantages of growth substances, with special reference to German conditions, and suggests that up to the present they have been of little practical value.

2235. K.
Die Wuchsstoffe des Handels. (Commercial growth substance preparations.)
Dtsch. Baumsch., 1950, **2**: 125-6.
The author suggests the necessity for some simplification of commercial growth substances which would enable growers to make up their own solutions as needed. A list is given of the most popular European commercial preparations available in Germany.

2236. BROWN, J. W., AND WEINTRAUB, R. L.
A leaf-repression method for evaluation of formative activity of plant growth-regulating chemicals.
Bot. Gaz., 1950, **111**: 448-56, bibl. 12, illus.
A technique for measuring quantitatively a formative effect of exogenous chemical growth-regulators is described. The method, which is based on the repression of leaf development subsequent to application of growth-regulator to the bud, exhibits a rather high degree of sensitivity and reproducibility. A number of uses are discussed. [Authors' summary.]—Camp Detrick, Frederick, Md.

2237. BROWN, R., ROBINSON, E., AND JOHNSON, A. W.
The effects of D-xyloketose and certain root exudates in extension growth.
Proc. roy. Soc., Ser. B, biol. Sci., 1950, **136**: 577-91, bibl. 7.
This investigation has been designed to examine the possibility that the substance which is exuded from the roots of *Sorghum* seedlings, and which stimulates the germination of the seeds of *Striga hermonthica*, may promote extension growth in the roots of a variety of species. The technique used involves observations on fragments 1·5 mm. long excised from the extending zones of roots of peas and maize. The effects on the growth of these segments of certain solutions of the natural exudate and of D-xyloketose, which also stimulates the germination of *Striga* seeds in very low concentrations, have been examined. It has been found that the exudates and the sugar promote extension growth in the root by stimulating longitudinal and lateral extension. Moreover, it has been shown that as with stimulation of the germination of *Striga* seeds, the activity of exudate and sugar solutions is destroyed by heat and it decreases during storage of the solutions. The conclusion is drawn that the substance which is released from the roots of *Sorghum* seedlings is a generalized root extension stimulator which promotes the germination of *Striga* seeds. The substance may be a carbohydrate or a simple derivative and may bear a close relationship to D-xyloketose. [Authors' summary.]

2238. HANSCH, C., AND MUIR, R. M.
The ortho effect in plant growth-regulators.
Plant Physiol., 1950, **25**: 389-93, bibl. 4.
Further evidence is presented for the blocking of plant growth activity by substitution of both ortho positions in phenoxyacetic and phenylbutyric acids. This same effect is noted for an indoleacetic acid with the 2 and 4 positions substituted. The evidence is interpreted to mean that plant growth regulators of the above types react with a plant substrate through an ortho position. [Authors' summary.]

2239. WELLER, L. E., AND OTHERS.
Changes in chemical composition of the leaves and roots of red kidney bean plants treated with 2,4-dichlorophenoxyacetic acid.
Plant Physiol., 1950, **25**: 289-93, bibl. 13.
The leaves of red kidney bean plants treated with 2,4-D contained lower percentages of protein and amino acids than did the controls. The roots of treated plants contained almost the same percentages of protein and the amino acids valine, histidine and arginine as did the controls, but the percentage of other amino acids was slightly lower. The reduction of most of the amino acids in the root and leaf tissue may be due in part to the translocation of these substances to the stem tissue. A depletion of non-reducing sugar was observed in both leaves and roots of treated plants, but there was no significant change in percentage of reducing sugar. The percentages of starch, polysaccharide, crude fibre, ash, ether extract, unsaponifiable material and fatty acids were practically the same for both the leaves and roots of treated and non-treated plants.—Michigan State College, East Lansing.

2240. NEELY, W. B., AND OTHERS.
Effect of 2,4-dichlorophenoxyacetic acid on the alpha and beta amylase activity in the stems and leaves of red kidney bean plants.
Science, 1950, **111**: 118, bibl. 8, being *J. Art. Mich. agric. Exp. Stat.* **1066.**
Data are tabulated which show that 2,4-D lowered considerably the activity of both the alpha and beta amylase in the stems of young bean plants 6 days after treatment with 0·05 ml. of a 1,000 p.p.m. solution. In the leaves, both treated and control plants showed equal beta amylase activity and no alpha amylase activity.

2241. NEELY, W. B., AND OTHERS.
Effect of 2,4-dichlorophenoxyacetic acid on the invertase, phosphorylase and pectin methoxylase activity in the stems and leaves of the red kidney bean plants.
Plant Physiol., 1950, **25**: 525-8, bibl. 10, being *J. Art. Mich. agric. Exp. Stat.* **1155.**
1. Invertase activity was absent in both the proliferated stem and leaf tissue of the red kidney bean plants

treated with 2,4-dichlorophenoxyacetic acid and the controls. 2. Pectin methoxylase activity increased in both the proliferated stem and leaf tissue of the treated plants. 3. Phosphorylase activity decreased in both the proliferated stem and leaf tissue of the 2,4-D treated plants. 4. There was no indication of the presence of a phosphatase acting on D-glucose-1-phosphate. [Authors' summary.]

2242. Corns, W. G.
Effects of 2,4-D and soil moisture on the catalase activity, respiration, and protein content of bean plants.
Canad. J. Res., Sect. C, 1950, **28**: 393-405, bibl. 20.

Bean plants grown under various controlled moisture conditions in a greenhouse, and sprayed with 2,4-D, showed differences in catalase activity, carbon dioxide output, total nitrogen content and visual response. Catalase and respiration of leaves were stimulated or depressed depending upon soil moisture, concentration of 2,4-D, and time after treatment, but there was not always a positive correlation between the two activities. Protein in leaves, with a few noteworthy exceptions, was decreased by 2,4-D. Extremes among leaf responses were induced in plants recently deprived of optimum moisture. Catalase, respiration, and protein content of stems were greatly increased by 2,4-D. This was especially noticeable in plants in moist soil. Soil treatments with 2,4-D solution followed by adequate moisture effected, in above-ground parts of plants, responses resembling those measured after foliage sprays on beans in moist soil. Fasciation of underground parts resulted only from a soil application involving relatively dilute (50 p.p.m.) concentration of 2,4-D. [Author's abstract.]—University of Alberta, Edmonton, Alta.

2243. Seeley, R. C., and Wain, R. L.
A note on the growth-regulating activity of 2: 6-dichlorophenoxyacetic acid.
J. hort. Sci., 1950, **25**: 264-5, bibl. 4.

The growth-regulating activity of a sample of 2: 6-dichlorophenoxyacetic acid as reported by Swarbrick (*A.R. Long Ashton Res. Stat. for 1944*, pp. 171-9, and *Sci. Hort. occ. Publ.* No. 5, 1947, p. 27) must be largely attributed to the 2,4-D which was present in the material.

2244. Gubányi, E., and Propáczy, A.
Ujabb serkentö anyagok alkalmazása a vegetativ szaporitásban. (**The use of newer growth substances in vegetative propagation.**) [German summary ½ p.]
Bull. Fac. Hort. Buda., 1949, **13**: 209-14, bibl. 7, illus.

Besides the well-known growth substances belonging to the indole- and naphthalene group, good results were achieved in Hungary with a 0·002-0·005% water solution of chromium trioxide, a cheaper, more readily available material. The tests were carried out on grape vine and ornamental tree and shrub cuttings, the treatment consisting of soaking for 2 to 24 hours. Germination of seeds was also found to be stimulated by the CrO_3 treatment.

2245. Makarevskaja, E. A., and Sulakadze, T. S.
The capacity of chlorotic plants for becoming saturated with water. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1948, **60**: 689-92, bibl. 3 [received 1950].

From experiments on grapevine, lemon, mandarin, maize and white acacia, it is concluded that the capacity of chlorotic leaves for becoming saturated with water depends on the increase in the concentration of growth substances in them.

2246. Redemann, C. T., Wittwer, S. H., and Sell, H. M.
Precautions in the use of lanolin as an assay diluent for plant growth substances.
Plant Physiol., 1950, **25**: 356-8, bibl. 3, illus.

Lanolin has been found to contain sufficiently high concentrations of oxidizing agent(s) to interfere seriously with its use as a solvent for quantitative bio-assay of indole-3-acetic acid and for plant growth regulators in corn pollen. A method for removing the oxidizing agents from lanolin with sodium hydrosulphite is described. [From authors' summary.]—Michigan State College, East Lansing.

2247. Naundorf, G.
Substancias inhibidoras vegetales. (**Growth-inhibiting substances in plants.**) [English summary 10 lines.]
Not. agron. Palmira, 1950, **3**: 1-61, bibl. 343.

In this summary of recent work, including his own, the author examines the relationship between growth-inhibiting substances and plant hormones on the one hand, and growth-inhibiting substances and antibiotics on the other. He attempts a classification of these substances and discusses their effects on the various physiological processes of the plant. The extensive bibliography is noteworthy.

2248. von Denfer, D., and Gründler, H.
Über wuchsstoffinduzierte Blühhemmung bei Langtagpflanzen. (**An inhibition of flowering in long-day plants induced by growth substances.**)
Biol. Zbl., 1950, **69**: 272-82, bibl. 5, illus.

Regular spraying of the leaves with hormone solutions (0·005 to 0·02% α-naphthylacetic acid or β-indolylacetic acid) markedly delayed flowering in the following long-day plants: *Sinapis alba*, *Fagopyrum sagittatum*, *Impatiens balsamina* and *Calendula officinalis*. In *Sinapis*, *Fagopyrum* and *Impatiens* the delay in flowering was found to be merely associated with a general inhibition of the development caused by an inundation with hormones, while in *Calendula officinalis* the onset of the reproductive phase is delayed as shown by the increased formation of foliage leaves on the main stem prior to the formation of the inflorescence. [From authors' summary.]—Göttingen University.

2249. Wirwille, J. W., and Mitchell, J. W.
Six new plant-growth-inhibiting compounds.
Bot. Gaz., 1950, **111**: 491-4, bibl. 3, illus.

Six organic ammonium compounds were found to inhibit internodal elongation of Black Valentine bean seedlings when applied to the stems or leaves. These ammonium compounds delayed blossoming of bean

plants 3-10 days when applied in amounts of approximately 0·1 mg. per plant. One of the more active of these compounds, (4-hydroxy-5-isopropyl-2-methylphenyl) trimethyl ammonium chloride, 1-piperidinecarboxylate, proved to be more effective in inhibiting stem elongation of bean seedlings than did either maleic hydrazide or 2,4-dichlorobenzylnicotinium chloride. [From authors' summary.]—Bur. Pl. Ind., Soils, Agric. Engng, U.S.D.A., Beltsville, Md.

2250. WILSKE, C., AND BURSTRÖM, H.
The growth-inhibiting action of thiophenoxy acetic acids.
Physiol. Plant., 1950, **3**: 58-67, bibl. 9.
The action of 2,4-D and its sulphur derivatives on the growth of oat roots in a constantly flowing solution was studied under the microscope.—Botanical Lab., Lund, Sweden.

2251. SIEGEL, S. M.
Germination and growth inhibitors from red kidney bean seed.
Bot. Gaz., 1950, **111**: 353-6, bibl. 4.
Extracts of red kidney bean seeds, untreated or treated by boiling or by irradiation with sunlight, inhibited germination and growth in flax, wheat, and other test plants. Irradiation activated and boiling inactivated, certain extracts. Only aqueous extracts were effective; only visible light increased inhibitory activity. The varying properties of extracts from different parts of the bean seed suggests that more than one inhibiting principle is present. [Author's summary.]—University of Chicago.

2252. HAVAS, L. J.
Response of seedlings to "Corhormone" and an embryonal extract of animal origin. [English, Hungarian summary.]
Bull. Fac. Hort. Buda., 1949, **13**: 221-3, bibl. 8.
Two heart extracts, one containing a so-called hormone, "Corhormone", the other without hormone (M.Gy.23) were found to have a stimulating effect on the development of radish seedlings. Further work with "Corhormone" is suggested, to ascertain if it can act as a polyploidizing agent.

Colchicine.

(*See also* 3031.)

2253. REESE, G.
Beiträge zur Wirkung des Colchicins bei der Samenbehandlung. **(The action of colchicine in the treatment of seeds.)**
Planta, 1950, **38**: 324-76, bibl. 55.
The morphology, the stomata and the osmotic pressure of seedlings from colchicine-treated seed were studied. However, the main object of the investigation was to throw light on the reasons for the different response of different species to colchicine treatment. For this purpose *Lepidium sativum* and *Petroselinum crispum* were selected as types of plant which yield some polyploid and exclusively non-viable seedlings respectively. In cress seedlings growth during germination was found to be due to cell elongation only, with the exception of the conducting vessels. Thus, the growing point and the vessels were the only tissues where polyploidy could occur. In contradistinction, cell divisions take place in all organs of parsley during the first 4 days. It may therefore be assumed that, in addition to the toxic effect of colchicine, the heterogeneity of the organs, composed of highly polyploid cells, prevents the development of the seedling. Hence, it appears that seed treatment of species in which cell divisions occur during germination is likely to be unsuccessful.—Kiel University.

2254. DALBRO, K.
Colchicine-induced chromosome-doubling in horticultural plants.
Yearb. roy. vet. agric. Coll. Copenhagen, 1950, pp. 205-30, bibl. 19, illus.
Illustrated descriptions are given of the various tetraploid vegetable and ornamental plants produced. Certain varieties of cabbage, radish, cress and lettuce among the vegetables and of eschscholzia, aubretia, sweet pea, clarkia, snapdragon, nemesia and others among the flowers appear to be promising from the horticultural point of view. In a discussion of the results it is emphasized that chromosome doubling must be carried out on a large scale, if it is to be used in plant improvement by breeding. The investigation was completed in 1947 and more recent literature is not included in the bibliography.

2255. TRAUB, H. P.
Colchicine poisoning in relation to *Hemerocallis* and some other plants.
Science, 1949, **110**: 686-7, bibl. 5.
Despite a report that *Hemerocallis fulva* L. contains colchicine, it was found that this and other species of *Hemerocallis* were very sensitive to colchicine. Polyploidy was induced by concentrations in aqueous solution in the range from 0·025% to 0·1%, while concentrations above 0·1% usually led to the eventual death of the treated plants. *Gloriosa rothschildiana* O'Brien, especially small seedling tubers, proved to be subject to colchicine poisoning with 0·05% to 0·2% concentrations.—U.S. Dep. Agric., Beltsville, Maryland.

2256. HAVAS, L. J.
Colchicine-mimetic actions of fungicides containing mercury and their inhibition by plant hormones. [English, Hungarian summary.]
Bull. Fac. Hort. Buda., 1949, **13**: 52-65, bibl. 21.
Previous experiments having shown that plant hormones simultaneously administered with colchicine inhibited or attenuated the effects of the alkaloid, a study was made to determine whether a further parallelism could be found in the reactions of seedlings when plant hormones were added to mercury compounds instead of colchicine. Wheat and cucumber responded readily in displaying the characteristic "colchicine effect" and confirmed the hypothesis. It is suggested that the analogous responses of plants to polyploidizing agents—such as colchicine, the above-mentioned mercury compounds and others—were due less to the analogy of their mechanical structure than to the similarity of their hormonal mechanism of action and particularly to the influence exercised on the polarity of translocation of the endogenous phytohormones. [From author's summary.]

Water cultures.

2257. Hoagland, D. R., and Arnon, D. I.
The water-culture method for growing plants without soil.
Circ. Calif. agric. Exp. Stat. **347,** 2nd edit., 1950, pp. 32.

This is a revised edition of a popular account issued in 1938 [*H.A.*, 10: 28] based on the investigations of the two authors. Since then, experience in the U.S.A. and elsewhere has failed, in the authors' opinion, to support the early exaggerated claims for the value of the technique. Their experience leads to the conclusion that for its successful operation a knowledge of plant physiology is essential, that its commercial application is only likely to be successful under limited conditions and expert supervision, and that its results are rarely superior to those of soil culture. If, despite this, the would-be "nutriculturist" persists, he will find much to encourage and enlighten him on pp. 23-32, which contain directions on type of container, nature of bed, aeration of root system, planting procedures, the management of solutions, selection and preparation of solution, and the use of nutrient solutions for demonstrating mineral deficiencies.

2258. Homès, M. V., and Ansiaux, J. R.
L'aquiculture, technique de production commerciale. **(Hydroponics; the technique of commercial production.)**
Trav. Centre Ét. Rech. Aquicult. **3,** 1950, pp. 7-60, illus.

The *Traveaux du Centre d'Études et de Recherches sur l'Aquiculture* are published at Brussels as *Comptes rendus de Recherches* by the Institut pour l'Encouragement de la Recherche Scientifique dans l'Industrie et l'Agriculture (I.R.S.I.A.). So far three years' experiments carried out with tomatoes and arum on a semi-commercial scale have given very encouraging results with yields superior to those obtained in ordinary glasshouse culture. In comparative tests oxygen circulation in the nutrient solution was found to be the most suitable method of root aeration. Attention is drawn to many minor shortcomings in soilless culture matters of techniques which could be overcome by further research. At present the rooting medium used —Rhine gravel—still presents certain difficulties, as it tends to raise the pH of the solution and to adsorb certain nutrients. The marketing by Belgian firms of fertilizers mixed in the correct proportions is an imminent development, which will make it easier for less chemically minded growers. The authors believe that gravel culture has a future in Belgium and vines are thought to be among the glasshouse crops to which this method could be profitably extended. The paper contains detailed comparative data on yields and techniques, and in addition many photographs and diagrams.

2259. Homès, M. V., Ansiaux, J. R., and van Schoor, G. H.
Bilans minéraux en aquiculture au stade semi-industriel. **(Maintenance of the mineral balance in water cultures.)**
Trav. Centre Ét. Rech. Aquicult. **3,** 1950, pp. 61-88.

Studies were made on how to maintain a favourable balance of nutrients in the gravel culture of tomatoes on a semi-commercial scale without undue waste of materials and labour. In 1949, when the quantity of nutrients supplied was regulated according to the growth curve of the plants, the utilization of minerals was found to be 40%, whereas only 20% was attained in 1948, when the solution was renewed at regular intervals. For practical purposes, however, it seems unnecessary to adjust concentration or composition of the solution too finely to the varying requirements of the plants in their successive stages, very satisfactory results having been obtained by fortnightly renewal of a standard solution. This technique is therefore recommended for use in commercial practice. Calculations should be based on a utilization of 25% of the minerals supplied. Full data of the investigation are presented.

2260. Gils, A.
Méthodes rapides d'analyse minérale. **(Rapid methods of mineral analysis.)**
Trav. Centre Ét. Rech. Aquicult. **3,** 1950, pp. 115-37, bibl. 15.

Instructions for the analysis of nutrient solutions in gravel culture.

2261. Singh, M. P.
Vegetable growing in water medium.
Indian J. Hort., 1950, **7**: 1: 14-15.

A preliminary trial is noted in which tomatoes grown in aerated nutrient solutions in tanks grew and bore as well as did plants set in a richly manured nursery bed. Size of fruit was very small in both cases.

2262. Schropp, W.
Wasserkulturversuche über die Wirkung des Magnesiums in Nährlösungen mit verschiedener Reaktion. **(The effect of magnesium in nutrient solutions of varying pH in water-cultures.)**
Z. PflErnähr. Düng., 1949, **48**: 65-84, bibl. 13.

Water culture experiments were carried out with different concentrations of Mg as $MgSO_4$ and $MgCO_3$ in nutrient solutions on maize, peas, linseed and hemp. Greater Mg deficiency was observed in the more acid solutions, and except for hemp, $MgSO_4$ was found to be the more suitable form. Neither Mg nor any other nutrient altered the pH of the sap, no specific influence of Mg on the protein could be detected, nor was the phosphate solubility or intake affected by Mg. In maize and peas the antagonism between K_2O and CaO was not so obvious as that between CaO and MgO, while the ratio CaO/MgO of the plant shoots showed general correlation with that of the nutrient solution, though somewhat less pronounced. No general optimum CaO/MgO ratio could be ascertained. [From author's summary.]—Weihenstephan Research Station, Germany.

Mineral nutrition.

(*See also* 3247, 3248.)

2263. Mulder, E. G.
Mineral nutrition of plants.
Annu. Rev. Plant Physiol., 1950, **1**: 1-24, bibl. 111.

The author reviews the following aspects of recent

research on the mineral nutrition of plants : The forms and amounts in which K, P, Mn and Cu occur in the soil; the intake of mineral nutrients by the plant, as governed by the composition of the nutrient medium (soil) and by the type and condition of the roots; and the physiological functions of nutrient elements in the plant, namely, K, the K-Na relationship, P, Ca, Fe, Mn, Cu, B, Mo and Al. Attention is drawn to the extensive bibliography which is limited to recent papers, particularly those published in 1948 and 1949.

2264. MASON, A. C.
The estimation of phosphorus, potassium, calcium, magnesium, iron, manganese and nitrogen in plant material.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 111-15, bibl. 2, illus.

Analytical methods are described for the estimation of phosphorus, potassium, calcium, magnesium, iron, manganese and nitrogen. 0·25 g. of dry leaf material is enough for a full analysis.

2265. VANSTONE, F. H., AND PHILCOX, H. J.
A flame method of spectrographic analysis.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 105-10, illus.

By the flame spectrographic analysis method described, with an exposure of 8 sec. as little as 4×10^{-9} g. of copper, manganese and rubidium can easily be detected.

2266. DELAP, A. V.
An interveinal injection needle.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 118-19, bibl. 2, illus.

The " needle " described allows of a quick, simple and effective method of injecting apple and similar leaves.

2267. MELSTED, S. W.
A simplified field test for determining potassium in plant tissue.
Bett. Crops, 1950, **34**: 1: 26, 42-5, bibl. 1.

The potassium test described is the well-known dipicrylamine spot test modified and adapted for field use. It is not accurate to the critical levels of K required in the sap for normal growth, but it can be used to confirm or disprove indefinite K plant-deficiency symptoms.

2268. SEYBOLD, A., MEHNER, H., AND BÜHLER, H.
Bestimmung des Phosphor- und Eisengehaltes verschieden gefärbter Laubblätter. **(The determination of the phosphorus and iron content in autumn-coloured and variegated foliage leaves.)**
Biol. Zbl., 1950, **69**: 229-40, bibl. 12.

The P and Fe content of autumn-coloured foliage leaves was found to be lower than that of green leaves, while the white areas in variegated leaves showed higher P and Fe values than the green areas. The physiological implications of these findings are discussed.—Heidelberg University.

2269. MCGREGOR, A. J.
A colorimetric method for the micro-determination of calcium in plant tissue extracts.
Analyst, 1950, **75**: 211-15, bibl. 2.

Calcium is extracted from fresh or dried plant material by an acetate reagent and precipitated as oxalate. The washed and centrifuged precipitate is used to reduce the red colour of a standard ferric thiocyanate solution. The decrease in intensity of colour, measured absorptiometrically, is proportional to the calcium content of the extract. Magnesium does not interfere. At very low concentrations the accuracy is of the order of 8%, but over the range 24 to 60 parts of calcium per million the accuracy of repetition is within 2%. Over a similar range of calcium concentrations the results are in close agreement with those obtained by permanganate titration. Added calcium is recovered to within about 2%. [Author's synopsis.]—West of Scotland Agric. Coll.

2270. HEWITT, E. J.
Trace elements in plant nutrition.
World Crops, 1949, **1**: 160-4, illus.

A general account is given of the role of Fe, Mn, B, Zn, Cu, and Mo in plants and the effects of deficiencies described with examples taken from tree fruits, vegetables and cereals.

2271. BOTTINI, E.
I microelementi nutritivi del terreno agrario. Nota II. Dosamento microchimico del boro nei terreni e nei vegetali. **(Nutrient micro-elements in crop soils. II. Micro-chemical determination of boron in soil and plant.** [English summary 6 lines.]
Ann. Sper. agrar., 1949, **3** (N.S.): 733-57, bibl. 27.

After discussing the methods commonly used the author describes and recommends a colorimetric method based on the isolation of the isomerous rosocyanine. This depends on the chemical changes occurring in the reaction of curcumin to boric acid, which are discussed. The limit of sensitivity of the method reaches 1γ boron.

2272. SCHROPP, W.
Über die Wirkung des Mangans in Form verschiedener Salze sowie in Gemischen mit anderen Spurenelementen (Spurenalen). **(The effect of manganese in the form of various salts and in mixtures with other trace elements.)**
Z. PflErnähr. Düng., 1949, **48**: 150-90.

Pot-experiments were carried out from 1939 to 1945 at the Weihenstephan Research Station on the effect of Mn as (1) manganese sulphate, (2) manganese phosphate, and (3) in various mixtures of trace elements. The plants used in these experiments included broad and dwarf beans and potatoes. The potato yields were higher when Mn was added alone as manganese sulphate than when in combination with B and Zn. Mn added in a special Mn mixture (47·7% Mn) gave better results on dwarf beans than as manganese sulphate. In broad beans boron deficiency was more marked than manganese deficiency, and therefore trace element mixtures were preferable to manganese sulphate alone.

2273. JONES, L. H. P., AND LEEPER, G. W.
The availability of various manganese oxides to plants.
Science, 1950, **111**: 463-4, bibl. 5.

Several oxides of manganese, both natural and synthetic, were compared in pot tests using Mn deficient soil and oats as test plants. Effects ranged from nil to complete cure. The oxides were also compared in the

laboratory as to their rate of releasing Mn to a weak reducing solution—School of Agriculture, University of Melbourne, Australia.

2274. Thomas, M. D., Hendricks, R. H., and Hill, G. R.
Sulfur content of vegetation.
Soil Sci., 1950, **70**: 9-18, bibl. 13.

Nearly one thousand samples of vegetation collected throughout the 11 Western States have been analysed for total sulphur in the leaves. Sulphate and chloride have been determined on many of these leaf samples and also on representative stems and blossoms from the same plant and on the soils on which the plants grew. Total leaf sulphur can vary over a wide range depending on the supply from the soil or the atmosphere; a twelve-fold range has been noted for alfalfa plants. The sulphate range parallels the sulphur range, and it is assumed that total sulphur minus sulphate represents organic sulphur. In the leaves of many species the latter exhibits a remarkably narrow range usually falling between about 0·2 and 0·4% on a dry weight basis. The lower range indicates sulphur deficiency, and the upper is not appreciably exceeded, regardless of how much excess sulphate is present. The conifers and some other species with volatile sulphur compounds—onion, rape, radish—may have 0·5 to more than 0·7% organic sulphur. [From authors' summary.]

2275. Conrad, J. P.
Sulfur fertilization in California and some related factors.
Soil Sci., 1950, **70**: 43-54, bibl. 26.

Applications of sulphur to legumes in California have in some cases more than doubled yields and thus also substantially increased succeeding crops of non-legumes. While sulphur in the form of sulphate is easily leached from soils there is some evidence that sulphide sulphur and certain organic forms of sulphur may be retained to some extent by soils. In sulphur-deficient soils, in the presence of easily decomposable organic matter, soil organisms may compete with plants for the small amount of sulphate available. Unfertilized soils may contain much less sulphur than phosphorus, but for some crops such as cabbage, onions and tobacco the sulphur requirements may be greater than those of phosphorus. The effects of external sources of sulphur such as industrial gases, fertilizers and spray materials are discussed.—Calif. agric. Exp. Stat.

2276. Harper, H. J., and others.
Fertilizer recommendations for Oklahoma crops.
Bull. Okla agric. Exp. Stat. **B-326**, 1949, pp. 15.

Recommendations, based on extensive soil analyses and cropping tests, are made concerning the kind and quantity of fertilizer materials that should be applied to some farm, vegetable and fruit crops on nutrient deficient soils in Oklahoma.

2277. Welch, F. J.
Fertilizer recommendations for Mississippi, 1950.
Circ. Miss. agric. Exp. Stat. **149**, 1949, pp. 12.

Recommended compound and top dressing fertilizers are listed for field crops, pastures, fruits and vegetables.

2278. Cooke, G. W.
Placement of fertilizers for row crops.
J. agric. Sci., 1949, **39**: 359-73, bibl. 14.

With special reference to field crops. All methods of placing gave consistently higher yields of peas than broadcasting fertilizer, the average advantage of placing being over 2 cwt. of peas per acre. Placement of fertilizer is of considerable benefit to crops with a short growing season and limited root range, and also to crops made sensitive to nutrient deficiency by the poverty of the soil or the immobilization of nutrients by drought.

2279. Jones, R. A.
Use of phosphoric acid as fertilizer.
Agric. Chemls, 1950, **5**: 5: 33-4, illus.

Methods of applying phosphoric acid in irrigation water are discussed. Although liquid phosphate is more expensive than solid, the former has a positive advantage both for rapidly growing intensive crops and for trees where penetration must be attained.

Irrigation and soil moisture.

(*See also* 3132, 3408.)

2280. Veihmeyer, F. J., and Hendrickson, A. H.
Soil moisture in relation to plant growth.
Annu. Rev. Plant Physiol., 1950, **1**: 285-304, bibl. 136.

In this review more attention is paid to actual trials with plants, including fruit trees, than to research dealing principally with the theoretical considerations of the problem. After discussing the permanent wilting percentage and methods of measuring soil moisture constants, the authors refer to the wide differences of opinion as to the availability of water to plants throughout the range from field capacity to permanent wilting percentage. The need for confirming container experiments by field trials is stressed. Turning to plant responses, they consider transpiration and photosynthesis, and measurements of plant growth rates, both in pot and field experiments, in relation to soil moisture. In the latter, reference is made to trials with individual crops, namely, deciduous fruits, citrus, dates, alfalfa, cotton, sugar cane, and sugar beets and watermelons. In a résumé of the problem it is pointed out that the reason that plants wilt may be explained by the position of the permanent wilting percentage on the energy soil moisture curve in the region where a slight decrease in moisture content results in a great increase in resistance to removal of water. The permanent wilting percentage is the most important soil moisture constant, and the accuracy of its determination is highly important. The matter is complicated by such factors as the slowness of movement of water into the mass of soil dried by roots, or the failure of roots to elongate rapidly enough into regions where there is still water above the permanent wilting percentage, as well as by difficulties inherent in measuring soil moisture in actual contact with the absorbing portion of the roots. Thus, if great care is not taken, erroneous conclusions may be drawn from both pot and field experiments.

2281. Oklahoma Agricultural Experiment Station.
Irrigation for Oklahoma.
Circ. Okla agric. Exp. Stat. **C-131,** 1948, pp. 28, bibl. in text, illus. [received 1950].
A discussion of points to be considered by the grower when deciding whether to irrigate is followed by a summary of the research work on irrigation problems in Oklahoma, and an account of the present irrigation research programme of the Oklahoma Agricultural Experiment Station. An annotated bibliography indicates sources of additional information.

2282. Stirk, G. B.
The effect of cultivation and irrigation practices on infiltration of water into some horticultural soils of the Murray Valley.
J. Aust. Inst. agric. Sci., 1949, **15**: 142-4, bibl. 1.
Little change in infiltration characteristics of soils of light texture has resulted from twenty-five years of irrigated culture. The minimum infiltration capacity declined by about 20% in most of the sandy loam types, but it appeared to have risen slightly in the sand types. [Author's summary.]

2283. Cavanillas, L.
Irrigation requirements in Spain.
Research, Lond., 1950, **3**: 365-9, bibl. 3, illus.
In order to get the greatest possible benefit from the existing water supplies, a network of lysimetric stations determine by gravimetric methods the water requirements of each crop. The mechanism and function of the stations are explained, and some results are given.—National Institute of Agricultural Research, Madrid.

2284. Northcote, K. H.
The horticultural potential, under irrigation, of soils of the highland areas in the mid-Murray river valley.
J. Aust. Inst. agric. Sci., 1949, **15**: 122-7, bibl. 12.
Considerable experience has accumulated on soils, irrigation and the behaviour of fruit crops on the older irrigation settlements such as Berri in S. Australia and Mildura in Victoria, from which certain general principles discussed here can be enunciated. Eight general criteria are tentatively set down for evaluating the soil types in relation to fruit crops commonly grown in the area. Five of these relate to the texture and minimum depths of soil required by citrus and apricots, stone fruits other than apricots, pears, vines, and figs. One relates to soil colour and two to drainage and irrigation practices.

2285. Koljasev, F. E.
A new field method of determining soil moisture. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk S.S.S.R., 1950, No. 4, pp. 31-7, bibl. 5, illus.
A new simplified field method for determining soil moisture by measuring the loss in volume of the soil under constant pressure, is described. Comparative tests showed that the error in measuring soil moisture by this method, in relation to the laboratory weighing method did not exceed ±0·5%. The method can be used in large-scale agricultural tests. Details for the construction of the apparatus are given.

Propagation.

(*See also* 2244, 2301.)

2286. Slatter, E. M.
The relation of temperature to seed germination.
North. Gdnr, 1950, **4**: 89-93, 127-9, bibl. 26.
Notes are given on the effect of temperature on seed germination and on stored seeds. Briefly, the conclusion is reached that the ideal temperature for seed storage is between 23° and 41° F., the seeds being kept dry with calcium chloride in airtight containers.

2287. Munn, M. T.
A method for testing the germinability of large seeds.
Bull. N.Y. St. agric. Exp. Stat. **740,** 1950, pp. 10, illus.
The method devised at Cornell is described and well illustrated. The seeds are placed in rolls of moist paper, which are in turn supported by trays or baskets in a slightly inclined upright position in a germinator. There is normal geotropism during germination and, besides detecting any abnormal condition and ascertaining the percentage of normal germination, the stem and root growth of the seedlings may be readily appraised as to vitality and freedom from seed-borne diseases. Peas, beans, groundnuts, sweet peas, nasturtium and other large seeds can be satisfactorily germinated. [From author's summary.]

2288. Munn, M. T., and Buchholz, A. B.
The quality of seeds on sale in New York in 1949.
Bull. N.Y. St. agric. Exp. Stat. **739,** 1950, pp. 71, illus.
Samples of agricultural flower and vegetable seeds, obtained on the open market in 1949 by inspectors of the Bureau of Plant Industry of the State Department of Agriculture and Markets, were examined at the New York State Experiment Station, Albany. Tabulated results for germination, field performance and honesty of labelling, with names of firms marketing the seed, are presented. One half of the total number of 2,975 samples were of vegetables.

2289. Matthews, J. D.
Spring grafting under glass.
Rep. For. Res. for year ending March 1949, 1950, pp. 28-9. H.M. Stationery Office, Lond., 1s. 9d.
The report contains reference to spring grafting trials with several species. Stocks consisted of potted one-plus-one transplants up to 15 in. high and pencil thickness at 2-3 in. from soil level. Ash, beech, larch, *Cupressus macrocarpa* and Douglas fir responded well, while pines and spruces proved more difficult. The veneer side graft and whip-and-tongue graft were more successful than the lateral puncture or slit graft. Cleft grafts were satisfactory when sap-drawer branches were left to keep the stock in good health.

2290. Garner, R. J.
Grafting.
Research, Lond., 1950, **3**: 248-53, bibl. 37, illus.

Some of the problems and applications of grafting are surveyed, including the questions of cambial contact and compatibility, the commercial applications of grafting, and its use in the construction of resistant plants, in tree surgery and in biological research. Finally, the nature of graft hybrids is discussed, with special reference to the work of Soviet biologists.

Preservation of material.

2291. CARRERA, C. J. M.
Medios liquidos para la conservación de materiales fitopatológicos y de frutas para el Museo Carpológico. **(Liquid media for the preservation of phytopathological specimens and fruits.)**
Bol. Minist. Educ. Univ. B. Aires, Fac. Agron. **28,** 1950, pp. 18, bibl. 9.
The composition of three fixing solutions is followed by that of 14 preserving solutions with notes on the particular uses to which they may be put.

2292. METCALFE, C. R., AND RICHARDSON, F. R.
The use of polyvinyl alcohol and related compounds as a mounting medium for microscope slides.
Kew Bull., 1949, No. 4, pp. 569-71, bibl. 2.
Experiments with two grades of "Solvar", S.57, containing 0 to 6% and S.357 containing 30-37% of polyvinyl acetate, showed the former to be unsatisfactory, but the latter to be a most promising mounting medium for a wide range of botanical material. It is less satisfactory with delicate or thin-walled tissues, because it causes excessive shrinkage.

Practical devices.

(*See also* 3168, 3440.)

2293. JAMISON, V. C., WEAVER, H. A., AND REED, I. F.
A hammer-driven soil-core sampler.
Soil Sci., 1950, **69**: 487-96, bibl. 6, illus.
The sliding-hammer tool described appears satisfactory for sampling most soils except those which are stony or extremely hard and compact. It takes cores of 470 c.c. and is convenient to use in the field and experimental plots for sampling to depths of less than 18 inches.—U.S. Dep. Agric.

2294. MINISTRY OF AGRICULTURE.
Farm fences.
Leafl. Minist. Agric. Lond., Fixed Equipment of the Farm, **6,** 1950, pp. 18, illus., 3d.
This leaflet describes with the aid of many clear illustrations the commoner and more useful types of fencing suitable for farms. It does not deal with hedges or "live" fences, or the more elaborate types of paling fence or iron bar fencing.

2295. IMPERIAL CHEMICAL INDUSTRIES, LTD.
Explosives in agriculture.
[*Publ.*] *I.C.I. Lond.*, 1950, pp. 19, illus.
The uses discussed include removal of tree stumps, land clearing, subsoil blasting, tree planting and cultivation, destruction of ants and ants' nests.

2296. PANCK, —.
Eine leistungsfähige Pflanzmaschine. **(An efficient planting machine.)**
Gartenwelt, 22 April, 1950, No. 8, from abstr. in *Rev. Agric. Brux.*, 1950, **3**: 754.
A new German planting machine is described, of simple construction and low price, that will plant rooted plants with or without balls of soil, potatoes, cuttings or nursery trees. There is an attachment for treating brassicas for cabbage fly control at the time of planting. Horse traction is sufficient for a 2-row machine, but a 4-row machine requires a tractor.

2297. ANON.
Double-row planter.
Amer. Nurserym., 1950, **91**: 11: 10, illus.
A double-row planter with hydraulic hoist that will plant evergreens up to 18-24 in. high and 2- and 3-year-old shrubs has been developed by Boulevard Nurseries, Newport, R.I. The planter is mounted at the front of a tractor and can space rows 3-4 ft. apart.

2298. HAHN, —.
Bündelmaschine für Gemüse und Schnittblumen. **(A bunching machine for vegetables and cut flowers.)**
Gartenwelt, 6 May, 1950, No. 9, from abstr. in *Rev. Agric. Brux.*, 1950, **3**: 753.
Describes a new Swiss bunching machine that is 10 times as quick as hand labour.

2299. NORGES STANDARDISERINGS-FORBUND.
Forslag til standard for hageredskap. **(Suggestions for the standardization of garden tools.)**
Norsk Hagetid., 1949, **65**: 189-94, illus., being *Medd. Norges Standard. Forb.* **184.**
In this communication the Norwegian Standardization Association assisted by a committee of the Norwegian Horticultural Society suggests standards for the following garden tools: (1) Spade; (2) potato fork; (3) rake; and (4) swan-necked hoe. The specifications are supported by detailed diagrams.

2300. PROCTER, C.
The rails run over the wheels.
Grower, 1950, **33**: 1205-6, illus.
A popular account of an 8-bay Dutch light glasshouse structure, 100 ft. × 80 ft., situated on a nursery at Sandy, Bedfordshire. The base of the house consists of rails which run over wheels mounted on concrete blocks. The house can be moved to a new position in about three-quarters of an hour and is accompanied by a portable boiler which is re-attached to fixed 4-in. hot water pipes.

2301. WORK, P.
Coated seeds.
Market Gr. J., 1950, **79**: 5: 16-19, bibl. 10, illus.
The advantages and limitations of coated seeds are discussed [see also *H.A.*, 20: 242]. Inclusion of fertilizer in the coating is not very promising, but that

of fungicides, insecticides, bird repellents and substances giving protection from weed-killers seem to have possibilities.

2302. Barclay, A. E., and Leatherdale, D.
Microradiography applied to botany.
Reprint from *Brit. J. Radiol.*, 1948, **21**: 251, pp. 8, bibl. 8, illus. [received 1950].
Radiographs of a rose leaflet, and subsequently leaves of several other horticultural plants, showed that either in or closely associated with the veins were large numbers of " spots " possessing a much higher atomic weight than that of the leaf structure. It seems likely that these spots come up to the leaves in the spring and early summer, which—with other evidence—suggests that they are stores of material on which the leaf draws as needed. The text is illustrated by the reproduction of 12 radiographs.—Nuffield Inst. for Medical Res., Oxford.

Noted.

2303.

a Albaum, H. G., Ogur, M., and Hirshfeld, A.
The isolation of adenosine triphosphate from plant tissue.
Arch. Biochem., 1950, **27**: 130-42, bibl. 20.

b Azzi, G.
Il sistema velocità-massa-struttura in relazione alla produttività e alla resistenza delle piante agrarie. **(Velocity-mass-structure system in relation to productivity and resistance of cultivated plants.)** [English summary 2 pp.]
Riv. Ecol., 1949, **1**: 3-19, bibl. 12.

c Clothier, G. E.
Air temperatures at Long Ashton, 1920-1949.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 167-72, bibl. 1.

d Cornfield, A. H., and Pollard, A. G.
The use of tetramethyldiamino-diphenylmethane for the determination of small amounts of manganese in plant material and soil extracts.
J. Sci. Fd Agric., 1950, **1**: 107-9, bibl. 10.

e Delap, A. V.
The application of trace elements to alkaline soils. A preliminary note.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 116-17, bibl. 2.
Experiments on cereals.

f Dionigi, A.
La velocità de sviluppo. **(The velocity of development.)** [English summary 8 lines.]
Riv. Ecol., 1949, **1**: 22-36, bibl. 4.

g Friedman, H., and Birks, L. S.
A Geiger counter spectrometer for X-ray fluorescence analysis.
Reprinted from *Rev. sci. Inst.*, 1948, **19**: 323-30, bibl. 9 [received 1950].

h Gerretsen, F. C.
Manganese in relation to photosynthesis. III. Uptake of oxygen by illuminated crude chloroplast suspensions.
Plant and Soil, 1950, **2**: 323-43, bibl. 17.

i Goidànich, G.
I fitormoni nella pratica agricola. **(Plant hormones in agricultural practice.)**
Ital. agric., 1950, **87**: 214-18, illus.
A popular account.

j Jakobsen, J. M., and Højendahl, K.
Investigation of methods and apparatus suitable for current control of the moisture in soil covered by crop.
Yearb. roy. vet. agric. Coll. Copenhagen, 1950, pp. 114-23, bibl. 5.

k Jones, J. K. N.
The structure of peach gum. Part I. The sugars produced on hydrolysis of the gum.
J. chem. Soc. Lond., 1950, pp. 534-7.

l Kalbfleisch, W., and others.
Farm trailers, wagons and racks.
Publ. Dep. Agric. Canada **830**, 1950, pp. 22, illus., being *Fmrs' Bull.* **159.**

m Kimme, D. C.
Farmers' public produce markets in Pennsylvania.
Progr. Rep. Pa agric. Exp. Stat. **28**, 1950, pp. 9, illus.
Mainly on fruit and vegetables.

n King, J. A.
Artificial stimulation of precipitation.
Proc. 23rd annu. Congr. S. Afr. Sugar Tech. Ass., 1949, pp. 100-7, bibl. 10.

o Lawrence, J. M.
Formation of reducing substances in pea seeds.
Arch. Biochem., 1950, **27**: 1-5, bibl. 12, being *Sci. Pap. Wash. St. agric. Exp. Stats* **880.**

p Luckwill, L. C.
How plant hormones aid crop production.
World Crops, 1950, **2**: 17-20, illus.
A general account.

q de Oliveira, A. J.
Estudos de estatística agronómica. IV. Importância da amostragem na experimentação agrícola. Exemplos numéricos. **(Studies on agronomic statistics. IV. The importance of sampling in agricultural trials.)** [English summary ½ p.]
Agron. lusit., 1948, **10**: 201-29, bibl. 14 [received 1950].
Trials with wheat and potatoes.

r Rautavaara, T.
Asutuskeskuksien orgaanisen jätteen käyttö kasvinviljelyssä. **(The use of town and village waste in plant production.)** [English summary 1½ pp.]
Maataloust. Aikakausk., 1950, **22**: 68-85, bibl. 48.

s SMITH, R. B.
The role of mechanics in the evolution of the herbaceous plant stem.
Bot. Gaz., 1950, **111**: 262-86, bibl. 17, illus.

t STOUT, P. R., AND OVERSTREET, R.
Soil chemistry in relation to inorganic nutrition of plants.
Annu. Rev. Plant Physiol., 1950, **1**: 305-42, bibl. 100.

u UDENFRIEND, S., AND GIBBS, M.
Preparation of C^{14} uniformly labeled fructose by means of photosynthesis and paper chromatography.
Science, 1949, **110**: 708-9, bibl. 6.

v U.S. DEPARTMENT OF AGRICULTURE, PRODUCTION AND MARKETING ADMINISTRATION.
Rules and regulations of the secretary of agriculture governing the inspection and certification of fruits, vegetables and other products.
Service and Regulatory Announcement U.S.D.A. **93**, 1949, pp. 8.

w WILLIAMS, E. J.
Confounding and fractional replication in factorial experiments.
J. Aust. Inst. agric. Sci., 1949, **15**: 145-53, bibl. 7.
A description of a popular experimental design.

TREE FRUITS, DECIDUOUS.

General.

(*See also* 2189, 2284, 3395, 3417, 3427, 3430, 3431.)

2304. WHITE, L., AND BOLLEN, A. G.
Tasmanian apple and pear industry.
Fruit World, Melbourne, 1950, **51**: 5: 7, 9, being reprint from *Quart. Rev. agric. Econ.*
The article, which deals mainly with apples, is based on a complete survey of the Tasmanian apple and pear industry, carried out in 1948 by the Bureau of Agricultural Economics in collaboration with the Australian Apple and Pear Marketing Board. The number of apple trees at present in commercial bearing is 2,810,000, but it will fall to just over half of that figure in 1963, if the rate of planting is not increased. There are 1,921 commercial apple and pear orchards, of which an average of 66% grow only apples and pears, the percentage in Devonport Municipality being 94 and in New Norfolk 6. Total new plantings and reworkings planned for the next 3 years include 34% Jonathan, 16% Granny Smith, 14% Democrat, 11% Sturmer and 9% Delicious.

2305. ENGSTEDT, G.
Fruktodlingen i södra Kalmar län. **(Fruit growing in the southern part of the Swedish province of Kalmar.)**
Sver. pomol. Fören. Årsskr., 1949, **50**: 61-72, illus.
The province is not an important area for fruit growing, but interest in the industry has greatly increased of late. A combination of fruit and onion production—the latter is a speciality of the district—is considered promising.

2306. WALKER, J. H.
The model gardens at Bradbourne.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 156-62.
An account of the amateur demonstration gardens, with diagrams of their lay-out, the minimum routine spray programme, cropping, and a list of the varieties grown.

2307. BAIRD, W. P.
The home fruit garden on the northern Great Plains.
Fmrs' Bull. U.S. Dep. Agric. **1522**, 1950, pp. 60, illus.
Fruit production on the northern Great Plains (in Montana, Wyoming, N. Dakota and S. Dakota) is limited by cold and drought. Windbreaks, winter protection and, for soft fruit, irrigation are normally necessary. With proper care, however, hardy varieties of apples, crabs, plums, Bessey cherries, service berries, grapes, currants, gooseberries, raspberries and strawberries, and seedlings of native fruits can be grown. Suitable varieties and cultural methods are recommended.

2308. PIROVANO, A.
I limiti utili di coltura del pero in clima caldo-arido. **(The practical limits of pear growing in a hot arid climate.)** [English summary 1 page.]
Ann. Sper. agrar., 1950, **4** (N.S.): 579-601, bibl. 21.
The author notes that most of the pears commercially grown in Italy are of north central European origin in contrast to the more southern origin of the wild pear, which is the normal rootstock in central and southern Italy. The result of such a union is lack of water equilibrium between root absorption in the stock and transpiration in the scion, and this causes premature defoliation followed later by autumn foliation, to the disadvantage of the physiological function of the tree. The drought conditions encountered in central and southern Italy also cause delay in ripening. The existence, moreover, of a semi-desert climate with frequent, very heavy dews and summer fogs, encourages fungous infections and fruit fall. Palliatives suggested are shading with vine curtains or other agency, appropriate pruning, and above all irrigation, but such operations are likely to prove uneconomic.

2309. REBOUR, H.
Le figuier en Algérie. **(Fig growing in Algeria.)**
Rev. hort. Algér., 1949, **53**: 348-56.
All aspects of fig culture for drying in Algeria are dealt with. [Noted from *C.R. Acad. Agric. Fr.*, 35: 584-6, in *H.A.*, 20: 100e.]

2310. MAURI, N.
Les figuiers cultivés en Algérie. **(The cultivation of figs in Algeria.)**
Bull. Dir. Agric. algér. **150**, undated [? 1949], pp. 56, being 2nd edit. of *Bull.* **93**.

First published as *Bulletin* 93 [see *H.A.*, 14: 1492], this comprehensive work has now been reprinted unaltered.

2311. MONTANARI, V.
La coltura dell' olivo e delle piante oleaginose nelle Venezie. **(The cultivation of the olive and of other oil plants in the Venetian Provinces of Italy.)**
Agric. Venezie, 1948, **2**: 389-402.
Near Venice the olive reaches its extreme northern climatic limit. The industry there, while not having the same importance as in Tuscany, is nevertheless of considerable value. An attempt is made in this article to show where improvement is due and could be made. The most favoured districts are round Lake Garda. Even there very little care is taken of the trees, and cultivation and manuring are neglected. Oil extraction plants in general need modernizing. The very numerous varieties are listed and the major characters of the more important ones are briefly noted. Seed oil plants encouraged during the war but now mostly in a rather precarious state include rape, groundnuts, sunflower, soya, and castor.

2312. DE WET, A. F.
The lay-out of an orchard. I. The staking of land, digging of holes and the planting of trees.
Fmg S. Afr., 1950, **25**: 145-8, 150, illus.
The recommended procedure for planting deciduous fruit trees is explained simply with the aid of photographs [see also *H.A.*, 19: 2771].

Breeding and varieties.

(*See also* 2457, 3179, 3369, 3394, 3407.)

2313. SPINKS, G. T.
Progress report on fruit breeding, 1949.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 31-3.
Named varieties which continue to crop well at Long Ashton are the dessert apple Cheddar Cross, a good cropper but with a tendency towards biennial bearing, the pears Bristol Cross and Cheltenham Cross, the late dessert plums Severn Cross and Thames Cross, the cooking plum Frome Cross and the blackcurrants Mendip Cross, Cotswold Cross and Malvern Cross. Notes are given on a number of promising seedlings, and on new crosses made during the last few years.

2314. GRANHALL, I.
Mutationsforskningens tillämpning på fruktträden. **(The application of mutation research to fruit trees.)** [English summary 15 lines.]
Sver. pomol. Fören. Årsskr., 1949, **50**: 105-26, bibl. 20.
The genetical, physical and chemical foundations of modern mutation research are outlined and discussed. X-ray experiments carried out 1944-49 at the Balsgård Fruit Breeding Institute in co-operation with Professor Å. Gustafsson have produced promising results (*Hereditas*, 35: 269-79). Some cases of probable fruit colour mutations in apple were found in 1948. In Williams (Bartlett) pear two scions gave fruits which ripened very late. One of these scions also showed a more pointed fruit shape than normal Williams. In 1949 a third Williams scion resulting from the same treatment (5,000 r) suggested chimaeral characters (shape and ripening time of fruits). A scion of Esperens Herre pear (Belle Lucrative) gave a more pronounced chimaeral picture with two normal and two yellow-green striped fruits. Experiments with other mutagenic agents, namely neutrons, radiophosphorus and nitrogen mustard gas, were started in 1949 in order to obtain mutations of different types. The primary effects so far observed indicate mutation possibilities also by these agents. [From author's summary.]

2315. MORETTINI, A.
L'opera di miglioramento nel campo della frutticoltura in Italia. **(Improving Italian fruit growing [by breeding].**
Riv. Ortoflorofrutt. ital., 1950, **34**: 87-93.
The author, after uttering a plea for increased government support for plant breeding work at the existing Italian stations, briefly discusses the new varieties of fruit which have already resulted from the work of Pirovano at Grotta Rossa near Rome and elsewhere on vines, pears and peaches. This work is outstanding and among Pirovano's productions are the table grape vine Italia, which is a cross between Bicane and Muscat of Hamburgh, Princeps N.561, Sauvis and such seedless varieties as Sultana Moschata, also numerous pears and peaches ripening at different times. The author's institute, Istituto di Coltivazione Arboree of the University of Florence, has made no mean contribution, and short notes are given on its new peaches, plums and pears. It is also working on kaki and apple. The Italians Paulsen, Prosperi, Dalmasso, Bogni and Bruni have also made useful contributions to vine breeding, Ragioneri, Pieri and Capucci to that of peach breeding and Ragioneri to pear breeding. At Acireale various forms of citrus showing resistance to *Deutorophoma tracheiphila* include Monachella and Interdonato lemons, the oranges Tarocco and Moro and the mandarin Bonaccorsi.

2316. NORSKE HAGESELSKAP.
Frukt- og baersorter. **(Top and small fruit varieties [for Norway].)**
Minneliste Hagedyrk.,* 1950, pp. 22-8.
An annotated list of top and small fruit varieties suitable for cultivation in Norway, those recommended for commercial planting by the Selection Committee of the Norwegian Horticultural Society being printed in bold type. An addendum suggests top fruit varieties for certain districts.

2317. VIVERO NACIONAL RAMA CAIDA.
Catalogo No. 2, Frutales: descripcion de variedades precios y condiciones de venta. **(Catalogue No. 2, Fruit trees: description of varieties, prices and conditions of sale.)**
Publ. misc. Minist. Agric. Argent. **329**, 1950, pp. 30.
This catalogue issued by the National Rama Caida Nursery, Mendoza, Argentina, gives lists of fruit trees, with brief notes on the varieties, suitable for commercial plantations and for private gardens in Argentina.

* Supplement to *Norsk Hagetid.*, 1950, Vol. 66, No. 2.

2318. Cuthbertson, J. D., and Stickley, R. M.
The production of cider fruit on bush trees. Observations on yields, 1945-1949.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 25-30, bibl. 5.
Yields are tabulated for 1947, 1948 and 1949 (the 12th, 13th and 14th seasons after planting) for 19 cider apple varieties planted in a trial in Hereford and for 18 varieties planted at Faversham, Kent. Earlier conclusions [see *H.A.*, 18: 2407] that the varieties Bulmer's Norman, Yarlington Mill, Reine des Pommes and Dabinett consistently produce good crops are confirmed. In a Long Ashton trial, yields are recorded for the 5 years 1945 to 1949 (10th to 14th seasons after planting). Best yields have been obtained so far from Dabinett, despite potash deficiency symptoms, and Sweet Alford, despite continued magnesium deficiency symptoms. There has been a tendency in Red Stoke towards biennial bearing, while both Knotted Kernel and Woodbine have proved slow to come into bearing.

2319. McMunn, R. L.
The Baxter Black Winesap apple.
Fruit Var. hort. Dig., 1950, **5**: 5-6.
A chance seedling of Arkansas, similar in appearance to the parent variety, very late maturing and an excellent keeper. Resistance to frost, spray injury, scab and fire blight are among its good qualities.—Illinois University, Urbana.

2320. Pénzes, A.
Adatok a vadkörték ismerethéhez. **(Data on the identification of wild pear *(Pirus piraster nivalis)*.** [English text 1 p.]
Bull. Fac. Hort. Buda., 1949, **13**: 66-74, bibl. 6, illus.
Descriptions of 11 Central European wild pears with well drawn identification keys.

2321. Krochmal, A., and Gibbs, L. C.
Stone fruit production in New Mexico.
Fruit Var. hort. Dig., 1950, **5**: 7-9.
Early blossoming after the characteristically mild winter exposes the trees annually to the hazards of spring frost. A list is given of stone fruit varieties which have proved their worth under these conditions in tests at the New Mexico A. & M. College Experimental Farm and in the fruit growing areas of the State.

2322. Guzzini, D.
Le " prugne vere ". **(The true prunes.)**
Ital. agric., 1950, **87**: 341-56, bibl. 18, illus.
This article will be of interest to students of the exact identity of the extremely numerous plums which go by the name of prune in different countries. In Italy, as in other countries, great confusion exists. This article at least indicates some of the variations in prunes which bear the same name, but does not suggest that the achievement of clarity will be easy.

2323. Buzi, C. C.
Le varietà di olivo coltivate in Liguria. **(Olive varieties grown in Liguria.)** [English summary 5 lines.]
Ann. Sper. agrar., 1950, **4** (N.S.): 57-79, illus.
Confusion in local nomenclature is clarified and details are given of the more important olive varieties of a province of north-west Italy with particular reference to oil production.

2324. Tóth, E.
A gyümölcshús és mag aránya cseresznye- és meggyfajtáknál. **(The proportion of pulp and stone in sweet and morello cherries.)** [German summary 5 lines.]
Bull. Fac. Hort. Buda., 1949, **13**: 199-201.
Comparisons were made between 17 varieties of sweet and 10 varieties of morello cherries grown on the same location in Hungary, and the data are tabulated. Considerable differences were noted in the absolute as well as in the relative sizes and weights.

2325. Hauville, —.
Exposé d'une mission pour l'étude des variétés française de l'olivier. **(Outline of a visit to study French olive varieties.)**
Rev. hort. Algér., 1950, **54**: 12-19.
In addition to notes on varieties encountered in southern France, methods of cultivation employed there are compared briefly with those used in Algeria.

Propagation.

(*See also* 2397, 2437, 2438, 3058, 3480, 3406.)

2326. Solovjeva, M. A.
Hastening the determination of the germinating capacity of fruit tree seeds. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 4, pp. 24-5.
In the method described representative samples are taken, and the shells removed from the kernels of stone fruits; the seeds are soaked for 3 days, then washed and dried slightly so that they do not stick to the fingers, and the testas are removed with a needle, beginning at the rounded end. The seeds are then placed on moist cotton wool in petri dishes and incubated at 20-23° C. Though light is not an indispensable factor, germination is best in diffused light, and aeration is necessary. The seeds begin to germinate on the 4th day and the germination is assessed from the 6th day onwards. The seeds of apricot, peach, mahaleb cherry and pear germinate very quickly, those of plum, sweet cherry and cherry plum [*Prunus cerasifera*] more slowly. Crab apple seed usually germinates very slowly.

2327. Ozerov, G. V.
The effect of physical methods of pre-sowing treatment and time of sowing olive seeds. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1949, **69**: 457-9.
The results of two years' experiments lead to the following conclusions: (1) The most effective pre-sowing measures for olive were the removal of the upper end of the stone, and the complete removal of the shell. (2) The best time for sowing is November, i.e. immediately after collecting the crop. (3) The ability of the olive seed to germinate after watering with salt water indicates a high degree of tolerance to salt.

2328. Mohrenweiser, D.
Das Pflanzen in der Baumschule. **(Nursery planting.)**
Dtsch. Baumsch., 1950, **2**: 169-81, illus.

Two large-scale (manual, combined and fully mechanized) nursery planting demonstrations are described and illustrated with 31 photographs. One of the demonstration plots was at Meckenheim, near Bonn, on heavy loam, the other at Pinneberg in Holstein, Germany's largest enclosed nursery area on sandy soil.

2329. Barry, J.-P.
Bouturage du murier. **(Propagating the mulberry by cuttings.)**
Progr. agric. vitic., 1950, **134**: 40-7, illus.
An account of trials with hormones as powders or in solution on cuttings of a number of mulberry varieties. The results were variable. With the variety Multicaule the most favourable results were obtained by 24-hour treatment with 25 and 50 p.p.m. α-naphthaleneacetic acid, and 50, 100, and 150 p.p.m. β-indolylbutyric acid.

2330. Rževkin, A. A.
Propagating olives. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 4, pp. 28-31.
It is proposed in the next few years to plant 3,000 hectares of olives in the Apsheron peninsula (Azerbaijan) not taking into account other large regions where olives may also be grown on an even greater scale, e.g. in the Turkmen S.S.R., the Crimea, the Krasnodar region, the Georgian and Armenian S.S.R. To meet the demand two methods of vegetative propagation are described. In one of them the suckers arising from the base of the stem are ringed (2-3 mm.) and then earthed up to a height of 15 to 20 cm., the ringed portion being kept moist with wet moss covered with pieces of paper as a mulch. Such shoots should be from 3 months to 1 year old. The best time for ringing is towards the end of March or beginning of April. Callus and roots begin to develop in 1 to 2 months and a good root system in 4 to 5 months. Such rooted shoots are cut away to the ring and can be planted direct in their permanent quarters. The second method is propagation from cuttings taken from 1-year-old branches, which are cut into 4-8 cm. lengths. The leaves are cut off except the terminal two on each cutting. The lower end is cut clean, immediately under a bud, and the cuttings are planted in sandy soil in a warm frame or hotbed; they are watered daily and kept at a temperature of 18-20° C. The best time for this operation is January to March. The percentage of rooted cuttings can be increased by the use of heteroauxin at 150-200 mg. per litre.

2331. Garner, R. J.
Studies in framework grafting of mature fruit trees. V. Fifteen years comparative performance of frameworked and topworked apple trees.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 71-4, bibl. 2, illus.
Observations on the variety Laxton's Superb grafted by one frameworking and three topworking methods upon 13-year-old Newton Wonder trees. Retaining sap-drawer branches for one season after topworking resulted in somewhat heavier cropping than plain rind grafting; the oblique-cleft grafted tree cropped more heavily than either the rind or rind with branches method. Frameworked trees had thicker trunks, more spreading branches and bore much heavier crops than those topworked. The individual fruits from the heavy cropping frameworked trees were as large as those from topworked trees.

Rootstocks.

2332. Loewel, E. L.
Vegetativ vermehrte oder Sämlingsunterlagen ? **(Clonal or seedling rootstocks ?)**
Dtsch. Baumsch., 1950, **2**: 134-6.
The author, director of the Jork Fruit Research Station, Germany, discusses briefly the need for new clonal rootstocks showing a higher degree of frost resistance than the East Malling types. Certain varieties including Grahams Jubilee have produced seedlings of exceptional uniformity, and on it future rootstock types may well be based.

2333. Kemmer, E., and Schulz, F.
Die Bedeutung des Apfelsämlings als Unterlage. (Standortsstadium.) **(The significance of apple seedlings as rootstocks. (Orchard stage.))**
Züchter, 1950, **20**: 27-37, bibl. 8 [summary in *Dtsch. Baumsch.*, 1950, **2**: 134].
The present article [see also *H.A.*, 9: 1160 and 14: 1055] gives a detailed report of observations on the orchard performance of apple seedling rootstocks in the series of tests initiated in 1930 at Berlin Dahlem, and continued there and in 195 small plantations throughout Germany. Though prematurely concluded on account of the war, the following observations were made: (1) Troubles during the early years were caused more by cultural neglect than by faulty rootstocks. (2) The severe winter of 1939/40 caused 30% total loss of grafted Boskoop in the plantations. In Dahlem, owing to greater care, this loss was only 2·8%. Unworked seedlings suffered only minor damage and no total loss, indicating that the resistance promoting influence of a rootstock on a scion variety cannot be gauged from the behaviour of unworked seedlings. (3) In Dahlem the seedlings of Weiss Wintertafettapfel proved superior to those of Klein Langstiel. Though the experiment was too short to draw final conclusions, it can be assumed that seedling rootstocks of diploid origin exist, which have a characteristic influence on the growth of the variety. (4) Belle de Boskoop used as seedlings and seedling rootstocks showed less variation. The ability of weak trees to catch up, already observed in nurseries, was confirmed in the orchard. (5) The frost of 1941/42 which damaged roots increased the yield in 1943. It can be assumed, however, that frost conditions can occur in the soil which improve yield without causing root damage. (6) Numerous Boskoop half-standards on seedling rootstocks from a single mother tree did not yield uniformly. [From authors' summary.]

2334. Moretti, A.
Portinnesti del melo e del pero in Francia e in Svizzera. **(Apple and pear rootstocks in France and Switzerland.)**
Ital. agric., 1950, **87**: 295-309, bibl. 7.
An account of observations made during a study journey to south-west France, Brittany and Normandy,

and to Switzerland. Apple rootstocks are described under 1. Seedlings; 2. Clonal rootstocks: (*a*) East Malling selections, (*b*) Dutch rootstocks, (*c*) French rootstocks, (*d*) Italian trials, (*e*) various [a description of Northern Spy]. Pear rootstocks mentioned are 1. French quince selections: (*a*) Roulon series, (*b*) Lepage selections, and 2. English quince selections. [Incidentally, this contains the fullest Italian descriptions of the East Malling apple rootstocks so far published.]

2335. Libes, R.
Porte-greffe du pommier. **(Apple rootstocks.)**
Progr. agric. vitic., 1950, **67**: 123-7.
An outline is given of the performance of East Malling rootstocks, based on reports from that Station and with a few notes on the behaviour of certain American varieties on these stocks.

2336. Aubert, P.
Essais de porte-greffes de pommiers. **(Apple rootstock trials [in Switzerland].)**
Rev. romande Agric. Vitic., 1950, **6**: 28-32.
Five E.M. rootstocks worked with 6 apple varieties were tested from 1938 to 1949 in a plantation near Lausanne. E.M. XII was found to be the most vigorous of the stocks, to produce the largest crops with all scions and to show the smallest death rate. It also grows well in sod, yet, in spite of all its advantages, nurserymen prefer E.M.XVI as being more easily propagated. E.M. XIII was moderately vigorous and was also suitable for sod culture. Anchorage was satisfactory, but nevertheless it is not likely to be widely used in the Valais. E.M. I had a vigour approaching that of E.M. XIII with 4 varieties but was hardly more vigorous than E.M. IX with Reinette de Champagne. It seems very promising for medium-sized bush trees of weak varieties. Trees on E.M. II did not thrive in sod but the stock should assure good crops under clean cultivation. It was more dwarfing than E.M. I, except in combination with Gravenstein where it was one of the most vigorous. Under the conditions of the test E.M. IX, which is not suited by sod, was satisfactory only in combination with Gravenstein. No effect on fruit and storage quality was observed in the case of the first 4 rootstocks, while fruits from trees on E.M. IX tended to be larger, more highly coloured, and to store relatively badly. Data on trunk circumference, cropping and mortality are recorded.

2337. Larsson, G.
Härdighet hos grundstammar i Öjebyn efter vintern 1948-49. **(The hardiness of [apple] rootstocks as shown at Öjebin during the winter 1948/49.)**
Fruktodlaren, 1950, pp. 14-15, illus.
In spring 1947, eight of the East Malling and four of the Alnarp apple rootstocks were planted at the State horticultural research station, Öjebyn, in northern Sweden. During the first winter there was a normal snow cover and none of the clones was injured by frost. During most of the second winter, however, no such protection was afforded, and only the Alnarp clone A2 emerged undamaged from this severe test. In order of hardiness, A2 came first, followed by E.M. XI and E.M. XVI.

2338. Hilkenbäumer, F.
Das Verhalten von Apfelstammbildnern in der Baumschule. **(The behaviour of apple stem-builders in the nursery.)**
Kühn Arch., 1950, **62**: 65-75, bibl. 5.
From results obtained during trials with intermediate stocks for apple, conducted by Halle University on a large number of varieties, individually described in this paper, the following have been recommended as the most suitable for Germany: Croncels, Jacob Fischer, Dominesti, and Hibernal. They all possess the high requirements of a first-class stem-builder, e.g. frost resistance, vigour, compatibility and resistance to scab, mildew and stem canker. Others are classified as promising but needing further trial.

2339. Oldén, E. J.
Försök med *Cotoneaster acutifolia* som underlag för päron. **(Trials with *C. acutifolia* as a rootstock for pears.)** [English summary 10 lines.]
Sver. pomol. Fören. Årsskr., 1949, **50**: 158-61.
In tests at Balsgård, Sweden, the hardy species *Cotoneaster acutifolia* was shown to be unsuitable as a rootstock for pears in view of its pronounced incompatibility at the union. Twenty-six pear varieties were involved in the trials.

2340. Bry, A.
Effets de l'affranchissement chez le poirier. **(The effects of " own-rooting " in pears.)**
Rev. hort. Algér., 1949, **53**: 250-7.
In cases where pear varieties show a certain amount of incompatibility with quince stocks and are liable to become weak or chlorotic, the trouble may be cured by encouraging own-rooting by low budding followed by slight earthing up later on, or by use of vigorous compatible intermediates such as the pear variety Curé [Vicar of Winkfield]. Cases are also described in which unthrifty, older, high-budded trees on quince have been restored by inarching pear seedlings. The behaviour of several combinations of pear scions and quince stocks is mentioned.

2341. Dorner.
Ist wurzelechte Anzucht bei Zwetschen ratsam ? **(Is it advisable to grow zwetschen on their own roots ?)**
Ratgeb. Gemüse- Obst- u. Gartenb., 1949, p. 212.
Zwetschen can be grown on their own roots if propagated by stooling or root cuttings. The advantages are: greater resistance to diseases and to frost; no bacterial canker; the possibility of drastic rejuvenation.
O.J.

2342. Burkholder, C. L.
Montmorency rootstocks.
Amer. Nurserym., 1950, **92**: 2: 98.
At the Southwestern Indiana Horticultural Experiment Farm, Johnson, Ind., the performance of Montmorency cherries on Mazzard and Mahaleb rootstocks has been compared over a period of 12 years. Trees

were planted on Princetown fine sandy loam, and soil and climatic conditions were favourable. After the first 3 years trees on Mahaleb made progressively greater growth and gave considerably higher yields than those on Mazzard. At the end of the eleventh season, 10 of the original 60 trees on Mazzard had died, whereas only 2 of those on Mahaleb were missing. On grubbing alternate trees in the twelfth season, it was found that 10-20% of the roots of many of the Mazzard stocks were dead or partly dead; all the Mahaleb root systems were in excellent condition.

2343. CAPUCCI, C.
Il Prunus Mahaleb ed il franco quali port' innesti del ciliegio. (***P. mahaleb* and *Prunus avium* as cherry rootstocks.)** [English summary 11 lines.]
Riv. Fruttic., 1950, **12**: 1-20, bibl. 4.

Observations over thirteen years in nurseries in the Italian Provinces of Bologna and Ravenna. Crown grafting cherry on mahaleb gave a higher rate of success than budding, and growth in the first year was greater than on *P. avium*, but in later years trees on *P. avium* became the larger. Trees worked on mahaleb came into fruiting earlier, produced more fruit over a given period and larger and earlier ripening fruit. As regards methods of working on *P. avium*, side grafting proved the best.

Pollination.

2344. LARSEN, P., AND TUNG, S. M.
Growth-promoting and growth-retarding substances in pollen from diploid and triploid apple varieties.
Bot. Gaz., 1950, **111**: 436-47, bibl. 31.

Reasons for the low pollinating value of triploid apple varieties, as compared with that of diploid varieties, were investigated at the Royal Danish Veterinary and Agricultural College, Copenhagen, and the University of Chicago, special attention being given to the relationship between the pollinating value of the pollen and its content of growth-promoting and growth-retarding substances. Pollen from the diploid variety James Grieve and the triploids Graastener, Tompkins King and Belle de Boskoop was used. In the triploid varieties the number of pollen grains per anther was 72-88% lower than in the diploids, and their percentage germination was much lower. In no case was germination improved by the addition of indoleacetic acid. A neutral and an acid growth-promoting substance and a neutral growth-inhibitor were obtained by ether extractions of dried pollen. The growth-promoting and growth-retarding activities of the first extracts were almost equal. After 2 hours of extraction an excess of growth-promoting activity developed. The total excess of growth-promoting over growth-retarding activity was considerably less in pollen from the diploid than in pollen from the triploid varieties. The results of determinations of these substances in pollen grains do not explain the differences in germinability and pollinating value of diploid and triploid pollen. From determinations of the weight of the material extracted, it is concluded that the growth inhibitor is more active in the Avena test than anemonin and parasorbic acid.

2345. RUGGIERI, G.
Considerazioni sulle recenti ricerche ed esperienze intorno alla biologia fiorale dell' olivo. **(Notes on recent studies and investigations on the floral biology of the olive.)** [English summary 1 p.]
Suppl. Ann. Sper. agrar., 1950, Vol. **4** (N.S.), No. 2, pp. i-ix, bibl. 14.

In his review of the present position the author stresses the fact that serious loss is often experienced owing to flower abortion of olives in southern Italy. He considers that the application of the results of recent work on self-fertility and self-sterility in the olive will probably be useful in regions of new planting where the use of cross pollinators may prove desirable. He recommends that work should be directed to the systematic study of the abortion of the ovary, premature fruit fall and failure to produce sufficient flowers.

2346. HANSSON, Å.
Binas blomtrohet och dess betydelse för fruktodlingen. **(The tendency of bees to confine themselves to one type of flower and its significance in fruit growing.)**
Sver. pomol. Fören. Årsskr., 1949, **50**: 27-35.

Substantial increases in yield have been obtained with insect-pollinated seed crops, where bees were fed with a sugar solution containing the scent of the flowers to be visited. The author suggests that this method could be usefully applied to the pollination of fruit trees, as attractive alternatives generally offer themselves to bees at blossom time.

2347. SINGH, S.
Behaviour studies of honeybees in gathering nectar and pollen.
Mem. Cornell agric. Exp. Stat. **288**, 1950, pp. 57, bibl. 40.

Self-unfruitful varieties of fruit trees are the crops chiefly affected by the localization of bees to small areas. It is suggested that cross-pollination in self-unfruitful and pollinizer varieties is brought about by bees localized on the adjacent sides of two trees; similar bees that spread out under temporary shortage conditions; and searcher bees—young bees starting to forage for the first time, or old bees out of a job. Besides, the pollen left by a bee on a flower on the fringe of her area is picked up by another bee, the fringe of whose area overlaps the first one, and is disseminated on blossoms in her area.

Growth and nutrition.

2348. KEMMER, E.
Zur Frage der Blattmodifikationen beim Apfel. **(On the problem of leaf modifications in apples.)**
Züchter, 1950, **20**: 153-6, bibl. 2, illus.

In pursuance of his studies on leaf modifications in apples (*ibidem*, 1947, 17/18: 378-82; *H.A.*, 18: 868) the author confirms his earlier conclusion that so far no proof has been produced for the fixation of a primary phase as a genuine juvenile form. The paper consists partly of polemics with holders of the opposite view, Passecker (*H.A.*, 18: 1625 and 20: 82) and Fritzsche (*H.A.*, 18: 1626), and partly of the presentation of new observations and experimental data

disproving fixation. For instance: Several scions of 1-year-old seedlings grafted on lateral branches of bearing Boskoop trees in April 1949 had "adult" leaves, whereas all the leaves formed on the seedlings retained their wilding character. It has also been observed that in each season the first leaves appearing on either layered shoots of rootstocks or on grafted varieties are much closer to the wilding type with a dented margin than those formed later. Fritzsche's statement that the primary, sterile phase could not be shortened artificially should be accepted with reservation. At Berlin-Dahlem seedlings grafted on paradise rootstocks frequently showed the adult character sooner and came into bearing earlier than seedlings on their own roots. In one case, where a quince bridge was inserted as a "shock" treatment of a seedling in its primary stage, flower buds were produced the same year [1949], while the control plant still remained juvenile. Other observations relate to the cutting down to soil level of two apple trees (varieties) on their own roots and to flower and fruit formation on the base of an old stem.

2349. DAMAST, J. Z.
Properties of the apple fruit grown under different environmental conditions.
Palest. J. Bot. (*R*), 1949, **7**: 103-12, bibl. 27, illus.

Samples of fruit of Red Astrachan, Peasgood Nonsuch, Delicious and Rome Beauty growing on Doucin stock were obtained from two areas, a high altitude of 800 m. with *terra rossa* soil, and a low altitude of 30 m. with medium heavy, irrigated alluvial soil. The author summarizes the differences found as follows: "1. Fruit grown in the mountain area is of longer shape, tending to be ribbed and ridged. The area of red colour was found to be larger. 2. The hypodermis is thicker, but the cuticle is equal in thickness to that of fruit grown in the lowlands. 3. While the mountain fruit is richer in certain constituents, e.g. dry matter, sugar, cellulose, acid and ash, its protein content is lower. 4. Rate of respiration [as measured with Peasgood only] is lower in mountain fruit. A causal correlation between protein content and rate of respiration was established. Intensity and quality of light, as well as temperature, would seem to be the primary factors involved in these differences. Mountain fruit, on the whole, showed a higher quality owing to its better external appearance, taste, and keeping propensity."

2350. ARMENISE, V.
Primi stadi di differenziazione del fellogeno in giovani rametti di ulivo. **(Early stages of phellogen differentiation in the young branches of the olive tree.)** [English summary 1 p.]
Nuovo G. bot. ital., 1949, **56**: 357-65, illus.

A study of the development of the phellogen in young olive branches showing spring and autumn differences.

2351. SHILL, O. W., AND MARTYR, R. F.
When Bramleys blossom again. Secondary flowering after spray damage.
Fruitgrower, 1950, No. 2845, pp. 13-14, illus.

A case is reported of Bramley apple trees in a Nottinghamshire orchard producing a substantial second crop of blossom in late May. Eighty per cent. of the first crop had been killed either by a DNC petroleum spray in the second week of March or by a severe frost in mid-April. Secondary inflorescences had been formed in the axils of spur leaves from about 40% of the injured buds. Flower buds of Newton Wonder, similarly damaged, did not produce secondary inflorescences. The production of substantial numbers of flowers apparently from flower initials formed since the second week in March raises a number of interesting physiological points.

2352. BASKAYA, M., AND CRANE, J. C.
Comparative histology of naturally parthenocarpic, hormone-induced parthenocarpic, and caprified fig syconia.
Bot. Gaz., 1950, **111**: 395-413, bibl. 20, illus.

Histological comparisons have been made of the following kinds of fig syconia sampled three times during the growth period: (*a*) naturally parthenocarpic Kadota, (*b*) caprified Kadota, (*c*) parthenocarpic Calimyrna induced by parachlorophenoxyacetic acid (PCPA), (*d*) parthenocarpic Calimyrna induced by gamma-(indole-3)-*n*-butyric acid (IBA), and (*e*) caprified Calimyrna. The relationship between the splitting of maturing syconia and the development of the achenes is discussed. It is concluded that splitting is the result of growth of the fruitlets within the syconium, the degree of splitting being closely associated with certain environmental conditions. The higher percentage of sugar in parthenocarpic than in caprified syconia is probably the result of the larger cortex and lack of seed development in the former. A short discussion points out the specificity of the synthetic growth substances and the diverse reactions they induce. Although it is believed that the hormone which controls the growth of the syconium, in part, may be produced in the ovarian tissue, it is now known that endocarp tissue plays no part in this in IBA-induced parthenocarpic Calimyrna syconia, in which it is lacking. [From authors' summary.]—University of California, Davis.

2353. STAEHELIN, M.
L'alternance de la production chez les pommiers. **(Biennial bearing in apples.)**
Rev. romande Agric. Vitic., 1950, **6**: 21-3.

In southern Switzerland blossom thinning is ruled out as a control measure for biennial bearing, as there is always the danger that a late frost may destroy the rest of the blossom. In a small-scale trial, carried out at Lausanne in April 1949, 970 flowers on several branches of Belle de Boskoop trees were sprayed with 0·05% α-naphthylacetic acid. The fruits from all treated flowers dropped within a month, while 229 flowers on the control branches developed 18 normal apples. Fruit thinning and cultural methods are recommended as a remedy.

2354. DAVIES, M. H. E.
Towards the control of biennial bearing.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 154-5.

Recent research on biennial bearing in fruit trees is summarized, and suggestions are made as to the best methods for reducing biennial bearing in the light of this knowledge.

Composition.

(*See also* 3381, 3384.)

2355. Bradfield, A. E., and Flood, A. E.
The organic constituents of fruit plants. I. An outline of a method of examination of the water and alcohol soluble constituents.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 100-4, bibl. 19.

By the chromatographic method described fructose, glucose, sucrose, raffinose, stachyose, sorbitol, citric acid, malic acid, tartaric acid, phloridzin, *epi*catechin and a quercetin arabinoside have been identified in an apple rootstock (411). The same carbohydrates and acids and sorbitol are found in Myrobalan B and Brompton rootstocks, and in Conference pear prunings. Leaves of Conference pear in late autumn contained no raffinose or stachyose. The ethyl acetate extracts of the apples, pears, and plums differ widely in composition. They are now being examined.

2356. Bradfield, A. E., and Flood, A. E.
Soluble carbohydrates of fruit plants.
Nature, 1950, **166**: 264-5, bibl. 8.

The use of paper chromatography has enabled the authors to detect sorbitol and the following soluble carbohydrates in shoots of apple, pear and plum: Fructose, glucose, sucrose, raffinose and stachyose. The identification of raffinose and stachyose was confirmed by chromatographic examination of their hydrolysis products. The presence of these oligosaccharides in apple shoots has been overlooked so far, although they are present in amounts of the same order of magnitude as those of the three more familiar sugars. No free galactose was detected, in spite of a careful search. Pentoses were also absent, but they were shown to exist as components of certain of the glycosides present in apple shoots. The paper concludes with a note on the detection of sorbitol, mannitol and dulcitol on paper chromatograms.—East Malling Research Station.

2357. Eaton, J. K.
The organic constituents of the apple tree. Preliminary work.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 93-9, bibl. 15.

A preliminary examination was made of the methyl alcohol extract of the leaves and shoots of 14 varieties of apple. Large amounts of phloridzin were found in the shoots of all varieties. Sorbitol was also present in shoots, amounting to 0·5% of the fresh weight.

2358. Kidd, F., and others.
The degradation of starch in apples removed from the tree at different stages of development.
J. hort. Sci., 1950, **25**: 289-96, bibl. 7.

Data obtained suggest that the degradation of starch in apples proceeds at a rate proportional to the surface area of the starch grain after a short initial delaying period during which synthesis of starch, which was in progress on the tree, continues at a diminishing rate for one or two days after gathering.

2359. Griffiths, D. G., Potter, N. A., and Hulme, A. C.
Data for the study of the metabolism of apples during growth and storage.
J. hort. Sci., 1950, **25**: 266-306, bibl. 11 and 7.

Data are presented from a number of experiments on the metabolism of apples during growth and storage, carried out at the Low Temperature Research Station, Cambridge, and at the Ditton Laboratory, Kent, during twenty years. Section I contains data from experiments on the metabolism of apple fruits. Section II contains data on the nitrogen content and respiration of the apple fruit.

2360. Clulo, G., and Berg, A.
Distribution of boron in the tissues of the apple tree.
Proc. W. Va Acad. Sci., 1947, pp. 43-9, bibl. 5, being *Sci. Pap. W. Va agric. Exp. Stat.* **375** [received 1950].

There is no deficiency of boron in the West Virginia orchards in which studies were made. The boron content of the tissues of the apple tree was found to be highest in the leaves. The bark, terminal, and flower buds were next, while the fruit and lateral buds were slightly lower. The wood contained least. Individual trees in a given age group vary slightly from one another in the boron content of their tissues. The boron content of the apple fruit as a percentage of dry matter decreases as the fruit develops. The available boron content of the soil varies in different orchards. There is seasonal variation in the boron content of apple tissues. The boron content of the bark and wood of each season's growth of a 5-year-old branch is uniform throughout, but is greater in the spring than in the autumn. Boron added to the soil in dry form or in solution is readily taken up by the apple. There was no difference in the boron intake of 1- and 2-year-old trees. Apple trees grown in sand culture with 2 p.p.m. of boron added, appeared normal in all respects. Trees grown in sand culture lacking boron manifested symptoms of boron deficiency the first season, but these symptoms were not related to internal bark necrosis. Four growing seasons were required to reduce the boron content of the wood of the current season's growth to a point where none was detectable. [From authors' summary.]

2361. Baltadori, A.
L'orientamento delle pendici e la variazione dell' indice di jodio negli olii d'oliva. **(The orientation of slopes and the variation of the iodine value in olive oil.)** [English summary 7 lines.]
Riv. Ecol., 1949, **1**: 55-65, bibl. 17.

The iodine value of the oil was highest in olives grown on north-facing (coldest) slopes, and lowest in those grown on the southern (warmest) slopes.

Manuring.

2362. Tolhurst, J., and Bould, C.
Nutrient placement in relation to fruit tree nutrition. II. Experiments on sub-soil injection.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 40-4, bibl. 2, illus.

The "Mapic" sub-soil injector manufactured in France is described and illustrated; at each movement 250 c.c. liquid are injected [presumably at a depth of 16 in., the penetration of the lance]. Soil studies are described on the effect of the volume of liquid and soil type on the movement of potassium in the soil, the effect of pressure on distribution, and on the effect of volume, pressure and soil type on surface seepage. Several fruit tree studies are described briefly. NPK injections at 4 l. per hole round standard apple trees under grass did not show any damage to roots, and after 12 weeks there appeared to be a concentration of roots round the points of injection. Young, stunted Lane's Prince Albert apple trees suffering from severe K and Mg deficiency did not respond even after 2 seasons to injections of various combinations of N, P, K, and Mg. Injection of calcined Kieserite, $MgSO_4.H_2O$, round young Laxton's Superb bush apple trees with a low Mg status did not result in an increased Mg content of the leaves over 2 years. Significant and very similar increases in K in the leaves of potash-deficient Blue Tit plum trees resulted from surface and sub-soil applications of potassium chloride; the increase in K from 3 spray applications of potassium sulphate just fell short of significance. Sub-soil injection of sodium ferri-silicate had a beneficial effect on lime-induced chlorosis in 20-year-old Purple Pershore plums, but acted more slowly than solid ferrous sulphate injected into the trunk. In a trial on Mg-deficient 20-year-old Lane's Prince Albert apple trees 9 treatments involving Epsom salts were applied in April 1949, 5 sub-soil injection patterns, 3 surface patterns and a control; no significant differences in the MgO contents of leaves had appeared by the end of August. [For Part I, see *H.A.*, 19: 2787.]

2363. Morettini, A.
Nuove direttive nella concimazione degli alberi fruttiferi. La concimazione in profondità con l'impiego di pali iniettori. **(The use of fertilizer lances in the orchard.)** [English summary 9 lines.]
Riv. Ortoflorofrutt. ital., 1950, **34**: 1-12, bibl. 14.

After a consideration of Swiss and French experience in the use of deep manuring with the fertilizer lance and of the facts that phosphates and potassic salts are likely to remain for long periods in the top soil layers when applied to the surface and that under sod, especially in dry hot conditions, nitrogenous fertilizers tend to rise to the surface and thus remain out of reach of tree roots, the author gives an account of the first year experiments in Tuscany and Ferrara on peaches, apples and olives. Nitrogenous applications made with a lance resulted in the year of application in better growth and colour of leaves in peaches and in diminished fruit drop in apples, but in no significant change in olives as compared with untreated trees and with trees given the same amounts of fertilizer on the surface. From potassic and phosphatic applications no result was visible nor, in this first year, was any expected. A lance of the Mapic type was used, a spray apparatus with a reservoir holding 50 litres and a pump capable of developing a pressure of 15 atmospheres: the team consisted of 3 persons. From these first results the author concludes that the method has immense possibilities but needs testing under different conditions before definite recommendations can be made.

2364. Garrard, H. L.
Potash tissue test for peach leaves.
Bett. Crops, 1950, **34**: 6: 17-22, 38, illus.

Discussion of recent developments. [See *H.A.*, 20: 1348.] It is thought that the modified Purdue potash tissue test may be useful in searching out low potash areas in orchards before potash deficiency symptoms appear.

2365. Gayford, G. W.
Liming orchard soils.
J. Dep. Agric. Vict., 1950, **48**: 125-6.

A short paper on the use and misuse of lime in orchards. Excess lime can result in deficiency of boron, manganese, and iron. In one instance a large quantity of lime induced a manganese deficiency in citrus; in another iron deficiency occurred in a high lime soil. Lime can be applied with advantage on soils which are acid, and this would apply to most of the orchard soils south of the Dividing Range. Types of lime, quantities and times of application are discussed. A chart is given showing the effect of soil acidity or alkalinity on supply of various plant nutrients.

Soil management.

(*See also* 2467.)

2366. Furneaux, B. S.
The soil and the fruit tree.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 53-60.

The author outlines the principles underlying the effect of the soil on the fruit tree along the following lines: (1) The soil as the environment of the fruit tree, emphasizing that it is "generally far more profitable to grow a crop upon a soil which suits it than upon one in which it is not really happy". (2) The assessment of soils, with reference to depth, natural drainage, texture and structure. (3) The soil requirements of the various fruit crops: cherries, dessert apples, culinary apples, pears, plums, gooseberries, blackcurrants, raspberries, loganberries and blackberries, and strawberries. (4) The management of soils. The author concluded with these words: "There is a pressing need for more soil survey work and for the correlation of crops with the soils identified. The introduction of new varieties and new methods makes this work perpetual. There is still much unanswered about the soil, but I submit that we have made a beginning, and that we are advancing along a road which holds out promise of rich reward."

2367. Vanderhasselt, P.
Algemene waarnemingen en besluiten bij profielonderzoek in verband met fruitaanplantingen. **(General observations and conclusions on profile investigations in connexion with fruit plantations.)**
Agricultura, 1949, **47**: 2: 20-50, from abstr. in *Soils and Ferts*, 1950, **13**: 719.

Profile investigations enable specific recommendations to be made regarding types of fruit trees suited to the soils encountered. Diagrams are given showing tree-root distribution as conditioned by the presence of clay pan, iron concretions, etc.

2368. Grunnet, H. Ø., and Dullum, N. (Statens Forsøgsvirksomhed i Plantekultur).
Nogle kulturforsog med frugttraeer og frugtbuske. **(Soil cultivation trials with fruit trees and bush fruit.)** [English summary 1¼ pp.]
Tidsskr. Planteavl, 1950, **53**: 321-35, being *Beretn. Statens Forsøgsvirks. Plantekult.* **425.**

The bulletin contains records from the following investigations at the Danish State Experimental Station, Blangstedgaard. I. *Effect of different sub-soil treatment.* The following treatments are compared: (*a*) Ploughing 20 cm. deep; (*b*) ploughing+loosening of subsoil with explosives (60 cm.); (*c*) ploughing+loosening in the furrow with a subsoiler (45 cm.); (*d*) trenching (changing top and subsoil) (60 cm.); (*e*) common digging (60 cm.); (*f*) common digging (75 cm.). The experimental area is rather heavy loam. The plots were prepared according to the above plan in the autumn of 1918. Apples, black currants and red currants were planted in the spring of 1919. The currants were removed in 1923. Black currants show a stronger growth and a slightly better yield in the (*d*), (*e*), and (*f*) plots compared to ploughing. The yield figures for red currants are not recorded on account of heavy damage from marginal leaf scorch in all plots. The apple trees were cleared in 1945, all in good condition. Husmoder (Bellefleur de France) produced the biggest yield in the ploughed plots, while Springrove Codlin (Beauty of Kent) responded to deeper cultivation with slightly increased yields. The small advantages gained from planting after subsoil treatment do not warrant deep cultivation in localities showing average conditions. II. *Effect of concrete plates beneath apple trees.* The experiment was started in 1920 with the varieties Gul Graasten and Bismarck after the following plan: (*a*) Planting according to common practice; (*b*) planting on a concrete plate (50 cm. in diameter and 8 cm. thick). The plate was placed 40 cm. below the surface level and the trees were cleared in 1944. As the records show, a concrete plate beneath the tree has not influenced growth or yield. III. *Effect of permanent grass-cover and straw mulching compared with common soil cultivation.* The experiment was carried out in the same area as experiment I. The trees were planted in spring 1919 and the recorded period runs from 1930 to 1943. The plan was as follows: (*a*) Clean cultivation; (*b*) permanent grass-cover (rye grass, *Lolium perenne*, sown in June 1929). The grass was mowed bimonthly during the summer time and the hay remained on the plots; (*c*) straw mulching. Husmoder (Bellefleur de France) showed increasing growth under clean cultivation. Permanent grass cover caused decreased growth, especially in the variety Springrove Codlin (Beauty of Kent). The records indicate that grass decreases the yield considerably, while the effect of straw mulching is similar to that of clean cultivation.

2369. Greffier, P.
Essai d'enrichissement en humus d'un jeune verger. **(Experiment in increasing the humus content of a young orchard.)**
Potasse, 1950, **24**: 44-6, from abstr. in *Soils and Ferts*, 1950, **13**: 1626.

Cereals, sown as cover crops in strips 3·5 m. wide between young fruit trees, proved both agriculturally and economically advantageous. Wheat was superior to oats. The calcareous clay soil was enriched in humus by ploughing in the stubble, purposely left long, and $(NH_4)_2SO_4$ was added to produce a favourable C/N ratio. Sowing was done at right angles in alternate years and fertilizing with P and K was carried out in autumn, N being applied in spring and summer. It was proposed to alternate vetch with wheat in a two-year rotation and to stop interculture after five years.

Irrigation.

(*See also* 2280.)

2370. Veihmeyer, F. J., and Hendrickson, A. H.
How much water does a fruit tree need?
Amer. Fruit Gr, 1950, **70**: 6: 12, 36-7.

The authors, of the University of California, cite a few of their experiments to illustrate the principle that water in the soil above the permanent wilting percentage is readily available to deciduous fruit trees. Transpiration was found to remain unaffected by variations in the level of soil moisture exceeding the permanent wilting percentage. The growth of fruits proved to be a sensitive indicator of the lack of water. This is shown in two graphs recording increases in fruit size in an irrigated and unirrigated Bartlett pear orchard in an inland valley of California. The decreased rate of growth occurred at about the time (9 July) the moisture content of the top 4 ft. reached the permanent wilting percentage. Peaches grew at a slower rate in the dry plots than in the wet ones when the soil moisture in the top 3 ft. was reduced to the permanent wilting percentage. Yellow Newton apples, however, showed no difference in growth whether irrigated or not, because the soil in the unirrigated plot did not reach the permanent wilting percentage. A reduction in yield will generally result if the moisture in the top 4 or 5 feet is allowed to remain long enough at the level of the permanent wilting percentage. Thus prune trees, which were without readily available water from the first half of July to the end of the season, had a total average crop of 2,810 lb. in 16 years as compared with 4,700 lb. per irrigated tree. On the other hand, trees irrigated frequently enough to keep the soil from remaining at the permanent wilting percentage, except for brief periods, yielded as much as those irrigated often enough to keep the soil moisture at a high level. The contention that irrigation reduces fruit quality has not been substantiated in the authors' experiments.

2371. Anon.
New irrigation equipment.
Amer. Fruit Gr, 1950, **70**: 6: 14-15, 25, illus.

Dealing with the portable type of sprinkler irrigation, the perforated pipe system, rotating sprinklers, volume guns and pumps. There are many illustrations.

2372. King, A. S.
So you want to install sprinklers.
Bett. Fr., 1950, **44**: 11: 7-8, 24-6, illus.

The author discusses the advantages and limitations of sprinkler irrigation systems, which are becoming increasingly popular in orchards in the north-west of the United States.

2373. Perrot, H.
Das Wasser und das Obst. **(Water and fruit.)**
Obstbau, 1950, **69**: 6: 87.
The author, an irrigation specialist, describes his low- and slow-spray type of orchard sprinkler which is easily convertible for use in frost protection. O.J.

Pruning.

2374. Hobbis, E. W., and Catlow, E.
Tree shape and pruning treatment in relation to crop yield in pears. Progress report.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 34-9, bibl. 2, illus.
A trial is described of pears [growing on quinces A and C and planted in 1937 and 1939], trained as open centre bush trees and as delayed open centre trees, which have received spurred or regulated treatment of laterals. Delayed open centre trees, whether spurred or regulated, have produced smaller crops than have open centre bush trees of the varieties Superb and Conference. Tree size has been influenced by the shape, open centre trees being greater in over-all size than delayed open centre trees. Regulation of laterals on open centre trees has resulted in a marked increase in cropping; on delayed open centre trees the position is reversed but not to the same extent. On delayed open centre trees a better formation of limbs has been obtained by regulated treatment of laterals than by spur pruning. [Authors' summary.]

2375. Metlickiĭ, Z. A.
Pruning of apricots by Professor Šitt's method. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 5, pp. 9-14, illus.
Apricots, owing to frost damage to fruit buds and blossom, bear very irregularly in many parts of Russia. As a control measure a new pruning system has been devised, by which the long fruit-bearing branches are shortened considerably, resulting in a mass formation of new, strong fruit bearing branches near the trunk of the tree. In the following year, if necessary, these and any other long branches are repruned. In normal years this pruning is carried out in September or early spring, but if, owing to frost damage, there is no prospect of yield, a summer—June—pruning can be made. Later blossoming and better frost resistance is said to result, especially if correct cultural practices are observed.

2376. Moretti, A.
La siepe fruttifera di Bouché-Thomas in Francia. **(The Bouché-Thomas "hedge" fruit trees in France.)**
Humus, 1950, No. 3, pp. 13-16, illus.
This method of training fruit trees so as to form a hedge is described and illustrated. It consists essentially of training main branches at 30° to the horizontal so that those of one tree cross those of its two neighbours in the row [see also *H.A.* 18: 2485].

2377. Påhlman, A.
En Linnélärjunges syn på beskärningen av fruktträd. **(The view of a pupil of Linnaeus on fruit tree pruning.)**
Sver. pomol. Fören. Årsskr., 1949, **50**: 73-81.
Jonas Theod. Fagraeus' treatise on the art of pruning fruit trees (*Konsten att skära fruktträd*), published in 1780, is reprinted *in extenso*, with an introduction by Påhlman.

Spraying to thin or to retain fruit.

(*See also* 2667.)

2378. Murneek, A. E.
Chemical thinning of fruit.
Wis. Hort., 1950, **40**: 224.
Chemical spray thinning of fruit depends on many factors, i.e. material, weather, variety of fruit, etc. At present two types are most commonly used: dinitro compounds, in liquid or powder forms as flower thinning sprays, and naphthaleneacetic acid for fruit thinning. Tentative recommendations are given for apple thinning. For biennial bearing varieties in the "on" year NAA at 20 p.p.m. 1-2 weeks after bloom and repetition if necessary; for annual bearers 10 p.p.m. 1-2 weeks after full bloom. Varieties Jonathan, Delicious and Winesap are very sensitive, and special care should be exercised with them.—Condensed from Bulletin of the Missouri Horticultural Society.

2379. Nyhlén, Å.
Hormoner mot för tidigt fruktfall. **(Hormones for the control of premature fruit fall.)**
Fruktodlaren, 1950, pp. 58-60.
Proprietary hormone preparations markedly reduced premature fruit fall in the apple variety Filippa in 1947 and 1949, the 1948 results having been invalidated by a gale. Data are presented of the trials which were carried out at Nyckelby.

2380. Marth, P. C., Harley, C. P., and Havis, A. L.
Effect of 2,4,5-trichlorophenoxyacetic acid on ripening of apples and peaches.
Science, 1950, **111**: 331-2, bibl. 3.
In experiments on 4 varieties of apple and 6 of peach, spraying fruits and spur leaves with 2,4,5-T at concentrations ranging from 25 p.p.m. to 75 p.p.m. accelerated ripening by a week to one month. With apples 10 p.p.m. was ineffective, while 100 p.p.m. or more caused marked foliage injury with deformed growth the following year; spraying was mostly done in June, and treated fruits failed to drop even after the fleshy parts had decayed. With peaches sprayed between May and July it was found that in all cases where spraying was done one month or more before harvest the fruit was misshapen and undersized, whereas, if carried out later, effects on size and quality were negligible. Owing to the risk of tree injury the use of 2,4,5-T as a fruit ripening agent cannot be recommended without further study.—U.S. Dep. Agric., Beltsville, Maryland.

Other cultural practices.

(*See also* 2416.)

2381. Hå, K.
Stenröjning. **(The removal of stones in land clearance.)**
Fruktodlaren, 1950, pp. 151-4, illus.

In some of the fruitgrowing areas in Sweden the land must be cleared of boulders before tree planting is possible. Machinery is described and illustrated for drilling holes in the stones and hauling them on a small travelling crane for removal.

2382. WHIFFEN, W. H.
Tanking worth the trouble.
Fruitgrower, 1950, **110**: 49-50, illus.
Many of the tree stakes and fence posts sold today have been inadequately treated with preservative. For the benefit of growers who wish to tank their own stakes, practical recommendations are made concerning seasoning of the wood, construction of the dipping tank and firebox, and the actual process of tanking.

2383. CLARK, L. H.
Straw *versus* grass. "Bird-nesting" in Essex.
Fruitgrower, 1950, pp. 121-2, illus.
An Essex fruit grower describes the individual tree mulch method—at the rate of 3 tons of straw per acre—and the improvement he achieved with it in a heavy soil. Immediately after picking pull the straw mattresses away from the tree trunks into the cultivated alley ways and watch for mice !

Picking and yield.

2384. AUBERT, P.
Qualité des fruits et époque de cueillette. **(The relation between fruit quality and time of picking [in apples].)**
Rev. romande Agric. Vitic., 1950, **6**: 54-6.
Three lots of Reinette du Canada were picked on 15, 22 and 29 September, 1948, one half of each lot being transferred to a fruit cellar, the other to a cold storage room where they were kept at 4° C. When the fruits reached maturity, they were tested on 23 March (cellar) and 5 April, 1949, respectively. With both methods of storage fruits harvested at the intermediate date obtained the highest number of points for quality. The colour of these fruits at the time of picking approximated to the shades of plates No. 277, 278, 282 and 283 of the International Colour Code. It is concluded that these colours indicate optimum maturity for picking.—Lausanne horticultural research station.

2385. AUBERT, P.
Qualité des fruits et époque de cueillette. **(The relation between fruit quality and time of picking [in apples and pears].)**
Rev. romande Agric. Vitic., 1950, **6**: 61-3.
The present paper presents the results of further trials on the effect of the time of harvesting on fruit quality, carried out at Lausanne on the lines set out in the above abstract. *Apples:* (1) Belle de Boskoop, picked 1946 and 1948: The first fortnight in October, when the colour is comparable to plates No. 278, 279, 291, 323 and 326, yields fruits of the best quality after storage. (2) Reinette de Champagne. Fruits picked 5 and 14 October, 1948, were better than those harvested earlier. *Pears:* (1) Duchesse d'Angoulême was found to be unsuitable for cold storage. In 1948 and 1949 early and late picking respectively were preferable; in both years the pressure test proved useless as an indicator of maturity at harvesting. (2) Passe Crassane should be picked late, the results of 1948 and 1949 being in good agreement. The temperature of 4° C., at which the fruit was kept in cold storage, was apparently a little too low.

2386. JARCEV, V.
Device for morello cherry picking. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 5, pp. 21-3, illus.
At the Mičurin Experimental Station a new type of basket for picking morello cherries has been devised, that leaves both hands free for picking and thus enables the rate of picking to be increased by 70-80%. A design for its construction is given. The basket which is hung round the neck of the picker, will hold 7·5-8 kg. of fruit; the bottom opens to empty the fruit with the minimum of damage.

2387. FINKNER, A. L.
Methods of sampling for estimating commercial peach production in North Carolina.
Tech. Bull. N.C. agric. Exp. Stat. **91**, 1950, pp. 29, bibl. 6.
This bulletin reports on the study made by the North Carolina Agricultural Experiment Station in co-operation with the Bureau of Agricultural Economics, U.S.D.A., to determine the most efficient sampling design for accurately estimating commercial peach production. Three phases of the problem were considered: (1) Estimation of the number of commercial peach orchards in the Sandhills area, (2) estimation of the number of peach trees in commercial orchards in North Carolina exclusive of the Sandhills area, and (3) estimation of the commercial production of peaches in the Sandhills area. "For estimating production of peaches in a concentrated commercial area, the investigation indicated that the most efficient sampling procedure is to stratify, by size of orchard, a list of commercial growers and allocate the sample to each stratum in proportion to the product of the number of orchards in that stratum and the standard deviation of the number of peach trees."

2388. (DEPARTMENT OF AGRICULTURE, DUBLIN.)
Fruit crop report, 1948.
J. Dep. Agric. Dublin, 1949, **46**: 167-71.
A brief report on weather, pests and diseases, market prices and a table showing in a general way the nature of yields obtained in each county.

Packing and marketing.

2389. HART, R., AND STEWART, N.
Packing apples in returnable market boxes.
Agriculture, Lond., 1950, **57**: 236-9.
Hints are given on packing apples in bushel and half-bushel returnable market boxes.

2390. PAINTER, A. C.
Fruit marketing today.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 180-2.
The marketing position is briefly reviewed. Ways of

improving market quality are discussed under pruning, manuring, thinning, grading and packing.

Noted.

2391.

a BORDING, K.
Regulativ for sortering, kvalitet, pakning og emballering ved udførsel af frisk, dansk frugt. **(Regulations on the grading and packing of fresh Danish fruit for export.)**
Erhvervsfrugtavl., 1950, **16**: 294-9.
Issued in June 1950 by the Danish Ministry of Agriculture.

b COUPIN, A.
État actuel de l'arboriculture fruitière en Tunisie—son orientation. **(The present condition and future trends of fruitgrowing in Tunisia.)**
Tunis. agric., 1949, **50**: 132-41.

c CRAVENS, M E.
Comments on Michigan peach quality.
Quart. Bull. Mich. agric. Exp. Stat., 1950, **32**: 575-81, illus.

d FJÄDERHANE, M.
Fruktodlingens anläggningskostnader. **(The capital required to start a fruit farm in Sweden.)**
Sver. pomol. Fören. Årsskr., 1949, **50**: 5-17.

e GARNER, R. J.
Some aspects of propagation research, with special reference to fruit trees.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 166-8, illus.
Reprinted from *Meded. Dir. Tuinb.*, see *H.A.*, 19: 2735.

f PRESTON, A. P.
Observations on the pruning of bush apples by renewal and spur methods.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 151-3, illus.
Already noted, *H.A.*, 19: 2776.

g REID, A. L.
American foul brood and other brood diseases and pests of bees.
Circ. Dep. Agric. Jamaica **26**, 1949, pp. 9.

h SHEPARD, P. H.
A Missouri apple from the fruit experiment station, Mountain Grove, Missouri: Whetstone (Conard × Delicious).
Fruit Var. hort. Dig., 1950, **5**: 16.

i WALKER, W. F.
Establishing an orchard [in Tasmania].
Fruit World, Melbourne, 1950, **51**: 3: 21-4.
Apples and pears.

j WELLINGTON, R., HOWE, G. H., AND LAMB, R. C.
Sweet cherries—present and future varieties.
Fruit Var. hort. Dig., 1950, **5**: 23-4, 26, reprinted from *Farm Res.*, Oct., 1949.

SMALL FRUITS, VINES AND NUTS.

Small fruits.

(*See also* 2189, 2190, 2307, 2313, 2316, 2366, 2368, 3371, 3373, 3390g, 3395, 3410, 3417, 3431.)

2392. WALDO, G. F.
Breeding blackberries.
Bull. Ore. agric. Exp. Stat. **475**, 1950, pp. 38, bibl. 18, illus.
A review of progress and the possibility of obtaining new blackberry types in Oregon for the Pacific Northwest, suitable for processing. Desirable characteristics such as high flavour were obtained from Logan and the western native trailing blackberries; bright colour from Himalaya, Black Logan, eastern upright and western trailing types; and large berries from Boysen. Sterility and sex inheritance were found to be important factors in breeding. Plant vigour was obtained mainly from European types and western blackberries, and leaf spot resistance from European types and Boysen. Blackberries from all sources contributed to frost resistance in the new types.

2393. GEORGIA COASTAL PLAIN EXPERIMENT STATION.
The Callaway and coastal blueberries.
Fruit Var. hort. Dig., 1950, **5**: 9-12, illus.
Callaway and Coastal, the first varieties of the rabbiteye blueberry, *Vaccinium ashei*, to be developed by systematic breeding, have now been released for general planting. Full descriptions are given and comparisons made.

2394. (N. CAROLINA AGRICULTURAL EXPERIMENT STATION.)
Introduction of two new blueberry varieties adapted to North Carolina.
Fruit Var. hort. Dig., 1950, **5**: 6-7.
ANON.
Two new blueberries resistant to canker.
Amer. Nurserym., 1950, **92**: 2: 99.
The canker-resistant varieties Murphy and Wolcott have been released by the United States Department of Agriculture and the N. Carolina Agricultural Experiment Station. Both berries are about the same size as Weymouth and of a slightly better colour and flavour. Wolcott ripens about the same time as Weymouth, while Murphy ripens slightly earlier than June and Stanley.

2395. WATT, J. H.
Currant culture in New Zealand.
Bull. N.Z. Dep. Agric. **282**, 1947, revised 1949, pp. 18, bibl. 2, illus.
The bulletin, which is fully illustrated, describes the following aspects of black, red and white currant culture in New Zealand: Location, site, drainage, soil preparation, propagation, varieties, cultivation, manuring including the use of green manure crops, pruning in winter and summer, harvesting and the control of diseases and pests.

2396. KRÜSSMANN, —.
Die schwarzen Johannisbeeren. (Black currants.)
Dtsch. Baumsch., 1950, **2**: 127-9, bibl. 7.
The choice of black currants from German catalogues is very limited, though the existing varieties, including Dutch and English, are numerous. Rectification of this shortcoming, and the adoption of the English classification system (Oldham, Hoare) [see *H.A.*, 16: 1698 and 19: 1647] comprising 4 groups, is suggested. The characteristics of these 4 groups are briefly described and varieties are listed.

2397. OVČINNIKOV, I. F.
Rooting of softwood cuttings of small fruits [and morello cherries]. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 5, pp. 20-1.
Propagation of softwood cuttings of black currants, gooseberries and morello cherries is described, and results for 1947-48-49 are tabulated. In 1948 and 1949 morello cuttings were treated with growth substance (heteroauxin) 50 mg. to 1 litre water, and this resulted in a fair percentage of rooting. Without treatment no rooting occurred.

2398. KIESER, M. E., POLLARD, A., AND STONE, A. M.
The effect of manurial treatment on the composition of blackcurrants and their products.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 159-62, bibl. 1.
Additional tests to those referred to in *H.A.*, 18: 2499 are described for the varieties Mendip Cross and Cotswold Cross. Increased nitrogen uptake by the bush was associated with a lowering of the ascorbic acid content of the fruit, but this effect was not shown consistently. Size and general quality were, however, improved by nitrogenous manuring. It is considered that ascorbic acid production may best be ensured by the choice of varieties with a naturally high ascorbic acid content and the maintenance of a high cultural level.

2399. FORTUNATOV, I. K.
Results of the introduction of *Ribes odoratum* into central Kazahstan. [Russian.]
Botaničeskiĭ Zurnal (Botanical Journal), 1949, **34**: 539-40.
The distribution of *Ribes odoratum* in the United States is mentioned with some account of its introduction into Russia. Observations on the Mičurin variety Krandalj (Crandall) are described. It was found to be a mixture of strains differing in vigour, winter hardiness and quality of fruit.

2400. TINCKER, M. A. H.
Recent research on the growing of raspberries.
J. Sci. Fd Agric., 1950, **1**: 131-4, bibl. 55.
Soil conditions and plant nutrition, related physiological investigations, virus investigations and utilization are the headings under which the literature is discussed.

2401. CADMAN, C. H.
The Scottish raspberry industry.
World Crops, 1950, **2**: 287-90, illus.
The history of the industry, its problems and future outlook are discussed briefly.

2402. (GRUBB, N. H.)
Raspberry varieties up-to-date.
Grower, 1950, **34**: 79-82.
A note of a talk at East Malling on the chief virtues and vices from the viewpoint of the grower of the following raspberry varieties: Lloyd George, Norfolk Giant, Newburgh, St. Walfried, Hercules and the new Malling varieties Promise, Malling X, M. Enterprise, Malling J, M. Notable and M. Landmark. Twelve more families had been raised this year mainly for breeding purposes, some of them from seed sent from Geneva, N. York.

2403. GRUBB, N. H.
Two new raspberry varieties.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, p. 75.
Two more East Malling raspberry varieties show promise and are now named as Malling Jewel (formerly Malling J, 33/54) and Malling Exploit (formerly Malling X, 51/84).

2404. ANON.
Raspberry cropping.
Tin-Print. Box Mkr, 1950, **26**: 304-36.
Data made available by the Scottish Raspberry Investigation, Dundee, show that Malling Promise, Landmark and J[ewel], and Lloyd George all cropped well in 1949, with Malling Promise returning 73·6 cwt. per acre. Factory tests carried out in conjunction with Chivers and Smedley's show that Lloyd George, Norfolk Giant, Malling J, Enterprise and Burnett Holm Seedling are superior for canning and that Burnett Holm Seedling is suitable for quick-freezing.

2405. HUDSON, J. P.
Bringing back the Lloyd George raspberry. New Zealand roots grow well here.
Grower, 1950, **34**: 159-60, illus.
Trial air shipments from New Zealand to England of 3-inch root cuttings of Lloyd George raspberry have indicated this to be a possible economic method of building up large stocks of virus-free material. The best time for arrival would appear to be late spring in England, when the soil is both warm enough and still moist; dry conditions in summer are less favourable.—Sutton Bonington.

2406. ROGERS, W. S.
Strawberry cultivation.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 163-5.
Latest developments are reviewed. Special stocks of the varieties Perle de Prague (early) and Auchincruive Climax (mid-season to late) are recommended and cultural methods for maintaining health and increasing yield are discussed.

2407. WATT, J. H.
Strawberry culture in New Zealand.
Bull. N.Z. Dep. Agric. **321**, 1949, pp. 27, bibl. 6, illus.
" The strawberry is probably the most popular of the small fruits grown in New Zealand. The high incidence of virus diseases, together with economic conditions, caused production to decline progressively over the

0 or 15 years before 1945, but a revival over the past ew years has brought the production back to the level f the peak period of 20 years ago." This bulletin eals with the various aspects of strawberry culture, ncluding runner production and pest and disease ontrol, in all parts of New Zealand except the Auckland istrict, where soil types and climate have resulted in a pecialized system of annual planting (see *Bull. N.Z. Dep. Agric.* 293, " Strawberry growing in the Auckland istrict "). Very little attention is at present paid to he production of disease-free runners, and it is thought hat the salvation of the industry may lie in the impor- ation of resistant or disease-free stocks from England nd America, and the adoption of a certification scheme imilar to that used in England. Most of the com- nercial varieties now grown are of New Zealand origin, ut stocks have become very mixed and there is so little niformity that the author is not able to give detailed escriptions of the varieties. Red core disease (*Phyto- hthora fragariae*) has caused serious losses in some istricts. Preliminary investigations indicate that all he important varieties are susceptible, but several arieties of minor economic importance show some esistance. Among the methods of culture described s the barrel method, suitable for early production in lasshouses or in gardens where space is limited, unners being planted in holes made in the sides of a arrel.

2408. Snyder, J. C.
Strawberry culture in Washington.
Bett. Fr., 1950, **45**: 1: 8, 19-21 and 2: 8, 22-3.
Discusses many aspects of strawberry culture, including reen manure crops, irrigation, cold storage of plants, nechanized planting, varieties and mulching.

2409. Menon, H. B.
El cultivo de la fresa. **(Strawberry culture [in Latin America].)**
Agric. venezol., 1949, **13**: 134: 18-23, bibl. 4, illus.
f suitable commercial varieties were used, and better ultural practices adopted, it is considered that straw- erries could be grown in Latin America with much nore success than at present. Suggestions are made oncerning varieties adapted to subtropical conditions, ne preparation of the soil, suitable planting systems, rrigation practices, mulching, harvesting and control f the more important pests and diseases.

2410. N.A.K.B.
Keuringsvoorschriften voor de aardbei 1950.* **(Instructions for the inspection of strawberries [in Holland], 1950.)**
[Publ.] *Nederlandse Algemene Keurings- dienst voor Boomkwekerijgewassen*, 1950, pp. 12.
his will be of interest to those concerned in strawberry ertification schemes in other countries. The instruc- ons deal with varieties, age, roguing, cultivation and uality, inspection in classes, requirements for firms tending to raise plants, requirements as to situation f plots, arrangement in plots, requirements regarding ne productivity and appearance of fruit, times of spection, points to be looked for, judging diseases, vision into health classes, general assessment, bulk inspection, stamping to denote certificate. Investiga- tions on productivity and virus infection of clones are carried out by the I.V.T. (Institute for breeding horti- cultural plants, Wageningen) and the I.P.O. (Institute for the investigation of plant diseases, Wageningen).

2411. Anon.
Approved strawberry planting material, 1950 season.
Qd agric. J., 1950, **70**: 147.
A note on the rules to be followed by Queensland growers wishing to join the scheme for providing approved strawberry planting material in the 1950 growing season.

2412. Colby, A. S., and Boll, H. L.
Vermilion, a new strawberry variety.
Fruit Var. hort. Dig., 1950, **5**: 3-4, illus.
Vermilion is the first variety to be released from the Illinois Agricultural Experiment Station in the course of its strawberry breeding programme which aims at the combination of red stele resistance with desirable commercial characters. Under local conditions the variety is June-bearing and medium to high in produc- tivity. The fruit stands up to carriage and is of more than average quality. No red stele has been found on the roots of plants growing on infested sites.

2413. Rogers, W. S.
A bud-sport in Royal Sovereign strawberry.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 61-2, illus.
A chimeral bud-sport in the Royal Sovereign strawberry is described. The variant differs from the type in that the leaf stalk hairs point towards the apex instead of spreading outwards. [See also *H.A.* 20: 620].

2414. Nitsch, J. P.
Growth and morphogenesis of the strawberry as related to auxin.
Amer. J. Bot., 1950, **37**: 211-15, bibl. 13, illus.
The action of the achenes upon the growth of the strawberry has been studied. Total removal of the achenes completely stops further growth of the fleshy part. Partial removal of the achenes results in fruits of abnormal shape because only the parts of the receptacle adjacent to the remaining achenes continue to grow. Only fertilized achenes are active. The weight of the fleshy part of a strawberry is a function of the number of developed achenes. The fertilized achenes can be replaced by synthetic growth substances in their action upon the growth of the receptacle. Beta-naphthoxyacetic acid and beta-indolebutyric acid in lanolin paste have induced strawberries of normal shape and size in the absence of achenes. The achenes have been found to contain relatively large amounts of free auxin, in contrast to the receptacles which did not yield any free auxin. The concentration of auxin in the achenes varies greatly with the stage of develop- ment. Free auxin fluctuations in the developing strawberry ovules are similar to those encountered in corn and rye kernels. [Author's summary.]—Cali- fornia Institute of Technology, Pasadena.

2415. Oldham, C. C.
Propagating strawberries.
Fruitgrower, 1950, No. 2840, pp. 941-2.
These extracts from a paper read at an N.A.A.S.

* Translation available.

conference at Trawscoed deal with the application of the special stock certificate scheme, isolation precautions, choice of soil and site on runner beds, manurial requirements, cultivation, pest and disease control, and lifting, grading and packing of runners.

2416. White, D. G.
Blossoming of fruits delayed by maleic hydrazide.
Science, 1950, **111**: 303, bibl. 5, being *Pap. J. Ser. Pa agric. Exp. Stat.* **1559**, 1949.
Spraying strawberries and black raspberries before, or at the outset of, flowering with 1,000 p.p.m. of the diethanolamine salt of maleic hydrazide postponed flowering for 24 to 38 days. Vegetative development was retarded but not injured. Four concentrations applied to Golden Delicious apple in the early pink bud stage resulted in early abscission of the fruit but did not retard vegetative or floral development.

Vines.

(*See also* 2188, 2244, 2284, 2307, 2315, 3198, 3200, 3374, 3417.)

2417. Brock, R. B.
More outdoor grapes [in England].
Rep. Vitic. Res. Stat. Oxted **2**, 1950, pp. 62, 6s.
This is a report of the findings at the author's private experimental station, Oxted, in 1949, a particularly good year for ripening the outdoor grape crop in England. The author discusses the various factors which influence ripening, including adequate moisture and temperature. An interesting feature of the 1949 figures is that the order of ripening of Continental vines at Oxted is surprisingly different from that of the same grapes in Switzerland. The author attributes this to the fact that England has a longer but less intense summer. Lists of varieties are given which at Oxted in the open in 1949 produced grapes suitable for both wine production and dessert. Others are mentioned as doing particularly well under cloches. What the home grower will very much appreciate are the author's hints on manuring, on pruning vines in the open, under cloches and against walls, on fungicides and insecticides and on methods of ensuring fertilization. These are based on his observance of European practice and on his own experience. His last eight pages concern fermentation and wine making.

2418. Mariman, G.
Viticulture en plein air. Chronique de l'année 1949. **(Outdoor viticulture. Review of 1949.)**
Courr. hort., 1950, **12**: 228-31, 280-3, illus.
An account of outdoor viticulture in Holland, Belgium, and England, with general notes on cultivation, diseases and pests, and wine making.

2419. Got, N.
Le cru de Banyuls. **(The vineyards of Banyuls.)**
Progr. agric. vitic., 1950, **134**: 68-74, 91-9.
An account of the viticulture of Banyuls-sur-Mer in the south of France, a region renowned for its red wines. The four principal varieties grown are Muscat, Grenache, Macabéo, and Malvoisie; others are Carignan and Blanquette.

2420. Barnett, R. J., and Campbell, R. W.
Grape growing in Kansas.
Circ. Kans. agric. Exp. Stat. **248**, 1949, pp. 37, illus.
This is a revision of Circular 177, published in 1935 and contains additional notes on the problem of winter killing, new varieties and the use of new spray materials. It supplies the grower with very full information on methods of grape production suitable for Kansas conditions. Special attention is given to pruning and training.

2421. Ronchi, V.
Luci ed ombre della viticoltura e della enologia. **(Vicissitudes in viticulture and wine making.)**
Ital. agric., 1950, **87**: 135-45.
A review of viticulture and wine production in Italy with maps showing the distribution of vineyards with vines on American rootstocks, and with hybrids on their own roots.

2422. Kondrackiĭ, A. A., and Protčenko, P. K.
New viticultural methods in northern Ukraine. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 4, pp. 38-43, illus.
Attempts to raise European varieties of vine commercially in the northern parts of the Ukraine have been unsuccessful chiefly because the plants are killed by frost in severe snowless winters, particularly after dry summers. This problem has been investigated at the Kiev research institute. It was found that the practice of covering cuttings with a mound of earth is harmful. In sandy soil with a clayey subsoil good results were obtained by planting in holes with a layer of manure at the bottom. In more sandy soil, trenches 1 metre across and 90 cm. deep were made with a 5 cm. layer of sand placed at the bottom, then a 15 cm. layer of manure, and the trench filled with sand from between the rows. Seedlings were planted in spring to a depth of 65-70 cm. Sowing lucerne between the rows in summer is recommended.

2423. Rangaswami, C.
The cultivation of seedless grapevine: a few practical hints.
Plant. J. Calcutta, 1949, **41**: 168-9.
Notes on the cultivation of the grape variety known as Seedless or Kismiss, of which about 40 acres are now growing in the Madura district of Madras.

2424. Zimmermann, J.
Selbstungen und Kreuzungen bei der Rebe (Gattung *Vitis*). Beobachtungen und Ergebnisse der Jahre 1938-1948. **(Selfings and crossings of grape vine (genus *Vitis*). Observations and results for 1938-1948.)**
Züchter, 1950, **20**: 81-91, bibl. 17.
In order to combine the resistance properties of the Müncheberg variety "Zuchthengste" with the good qualities of the more important varieties grown in Baden, numerous experiments were made at the Staatl. Weinbauinstitut, Freiburg/Br., Germany. Selfings and crosses of Gutedel, Blauer Spätburgunder, Ruländer and Traminer, and crosses of these varieties with Zuchthengste as pollinator, were analysed and evaluated for quality and downy mildew (*Plasmopara viticola*) resistance.

2425. Breider, H.
Zur Züchtung neuer Qualitätssorten bei der Weinrebe. **(The breeding of new, high quality vines.)**
Züchter, 1950, **20**: 135-53, bibl. 9.

One of the objects of the vine breeder must be to cater for locations outside the first-quality regions and to evolve varieties which are earlier maturing and in other ways superior to the old standard varieties, Riesling and Sylvaner. In this investigation, which extended over the exceptionally good vintage year of 1947 and the following very poor year, the heredity of the characteristics of quality was studied, viz. of total sugar content, degree of acidity and their relationship. It was found that the genes for the first two factors are inherited independently and that no physiological correlation between them exists, at least not in years when the grapes attain full maturity. A close correlation of 80% was shown to exist between total sugar content and quality and a negative correlation of $x = -0{\cdot}78$ between total acidity and quality in 1948, while quality and acidity are not related in so-called "mature" years. In 1947 and 1948 the correlation between quality and the ratio of total sugar content: total acidity was 56% and 83% respectively. On the basis of calculations the author suggests a simplified method of seedling selection which, however, is workable only in the more "immature" vintage years. The results are of special interest to breeding stations situated in the less favourable vine regions.—Vine breeding institutes at Alzey and Würzburg.

2426. Cebriĭ, M. P.
The intergeneric hybridization of the grapevine. [Russian.]
Vinodelie i Vinogradarstvo (Wine making and viticulture), 1950, No. 7, pp. 16-17, illus.

It is claimed that intergeneric crossing was obtained between *Ampelopsis* spp. and *Vitis* spp. by (1) fertilization just before the egg cells died, (2) adding to the pollen of the ♂ plant pollen of the ♀ plant (¼ portion), (3) applying to the flowers of the ♀ plant particles of the pistil of the ♂ plant, (4) making use of pollen which had been artificially submitted to the perfume of the pollen of the ♀ plant, (5) fertilizing with the pollen of two varieties, one of which is compatible to the ♀ plant. The best results were obtained with the first method.

2427. Cebriĭ, M. P.
The use of local vine varieties in hybridization. [Russian.]
Vinodelie i Vinogradarstvo (Wine making and viticulture), 1950, No. 6, 25-6, illus.

In limited tests in the Ukraine it was found that hybrids with local Moldavian and Georgian varieties as ♀ parents and Riparia and Rupestris selections as ♂ may prove valuable for breeding high quality, phylloxera-resistant vines.

2428. Boulay, F.
Note sur une technique nouvelle de production des vignes greffées-soudées. **(Note on a new method of grafting vines.)**
Progr. agric. vitic., 1950, **133**: 198-203, illus.

The new technique described is a combination of two methods already employed, root grafting and the application of paraffin wax to the union.

2429. Markin, M. I.
Propagation of vines by rooted cuttings. [Russian.]
Vinodelie i Vinogradarstvo (Wine making and viticulture), 1950, No. 6, pp. 18-22, illus.

Methods of propagating vines by cuttings with 1 or 2, and 3 or 4 buds are described. Shoots taken of healthy and vigorous plants were stood in water for 24 hours and then cut to the required length. To achieve best results, cuttings of 1 and 2 bud length were planted vertically in small paper pots during the first half of March, kept under glass till they had rooted, and then transplanted. Those with 3 and 4 buds were raised out of doors. On the southern slopes of Crimea the planting of 3 and 4 budded cuttings and transplanting of 1 and 2 budded cuttings take place from mid-April to mid-May in prepared nurseries in deep trenches, where they make up to 80 cm. growth the first year.

2430. Grard, A.
A propos de la stratification des greffes-boutures de vigne. **(The stratification of vine cuttings.)**
Progr. agric. vitic., 1950, **134**: 15-17.

The advantages of applying paraffin wax to grafted cuttings before they are stratified are pointed out.

2431. Cosmo, I.
Ricerche sulla correlazione fra topofisi e percentuale di ripresa delle talee di vitigni portinnesti II.* **(Correlation between topophysis and quality of rooted cuttings of vine rootstocks. II.)** [English summary ½ page.]
Ann. Sper. agrar., 1950, **4** (N.S.): 201-11.

Results of previous trials, also at the Conegliano Station in north Italy, are confirmed as regards the following vine rootstocks: Rupestris du Lot, Riparia Gloire, Berlandieri × Rupestris 420, Berlandieri × Kober 5BB, Berlandieri × Rupestris 301A and Golia. The behaviour of each rootstock is found to be different and since they are all influenced by environmental factors it becomes necessary to test each one in different localities. It would appear, moreover, that in some rootstocks all the wood can be used for propagating and that, although the wood in the basal sections of the internodes matures best, these sections do not necessarily show the best rooting.

2432. Ballatore, G. P.
Contributo allo studio di alcuni stimolanti ormonali nelle radicazioni delle talee. **(A note on the study of hormonal effect on the rooting of cuttings.)**
Reprinted from *Agric. nuova*, 1950, Vol. **2**, No. 4/5, 8 pp.

Notes on the use of Seradix B_1 and Rootone in powder form, and of vitamin B_1 0·5 p.p.m., naphthaleneacetic acid 0·1 p.p.m. and Seradix A dose C in liquid form on cuttings of *Jasminum grandiflorum*, a number of vine hybrids and two vine species, Rupestris du Lot and Riparia. Other forms and quantities of the different

* For I, see *Ibid.*, 2 (N.S.): 383-95; *H.A.*, 18: 2513.

substances were also used. From the great diversity of results the greater ease of application of the powder product was evident. Rupestris and Berlandieri hybrids in general reacted more favourably than Riparia or its hybrids. The tests were repeated with powder forms only. Hybrid 420A (Berlandieri × Riparia, Mill. de Gr) did not react to any treatment. All the rest reacted favourably and appreciably to one of three types of Seradix B by earlier growth and increased rooting. A third experiment will concern optimum treatments for the different vines.

2433. Tavadze, P. G.
The influence of growth substances on production of first-quality grafts. [Russian.]
Vinodelie i Vinogradarstvo (Wine-making and viticulture), 1950, No. 6, pp. 26-7.

In this experiment carried out in Georgia, the phylloxera resistant cross Riparia × Berlandieri 5BB was used as the rootstock and Rkaciteli as the scion. The stock alone was treated with 0·0005% 2,4-D and 0·01% heteroauxin, at 25-27° C., for 12 and for 24 hours. The best result was achieved by the 12-hour treatment with 2,4-D, applied to the upper part of the stock, followed in effectiveness by the 12-hour upper part treatment with heteroauxin. The 24-hour treatments were less effective, and heteroauxin applied to the lower part of the stock was harmful.

2434. Weaver, R. J., and Williams, W. O.
Response of flowers of Black Corinth and fruit of Thompson Seedless grapes to applications of plant growth-regulators.
Bot. Gaz., 1950, **111**: 477-85, bibl. 11, illus.

The treatment at full bloom of flower clusters of Black Corinth with beta-naphthoxypropionic acid at 200 p.p.m. resulted within 12 days in berries and clusters larger than those of untreated controls. The maturation of these treated clusters was accelerated. Applications of 4-chlorophenoxyacetic acid at 5 p.p.m. resulted in many large berries containing seeds or seedlike structures in contrast to berries of untreated controls or of other treatments which produced smaller seedless fruit. Treatment with 8 other growth-regulating substances resulted in no marked responses other than injury. Very young berry clusters of Thompson Seedless grapes treated with concentrations of 20 p.p.m. of 4-chlorophenoxyacetic acid resulted in larger clusters and berries than untreated controls. The treated clusters were too compact for commercial use as table grapes. Clusters treated with concentrations of 200 p.p.m. of the compound showed little injury but developed pedicels more than twice as thick as the controls. Five other compounds produced varying amounts of injury which, in some instances, resulted in the production of large berries, probably owing to the fewer numbers of normal berries per cluster in comparison with the untreated ones. Young clusters were much more responsive than older ones. Some treatments resulted in only temporary curvatures of the rachis, its branches, and the pedicels; in more severe treatments the rachis and its branches enlarged, split, and callused, and many berries failed to enlarge; some clusters were killed.—University of California, Davis.

2435. Kondo, I. N.
Inducing root development in grape vine cuttings with growth substances. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1948, **60**: 685-8, bibl. 11 [received 1950].

In treating vine cuttings very good results in stimulating rooting were obtained by treatment for 24 hours with heteroauxin (300 p.p.m.), α-naphthaleneacetic acid (25 and 50 p.p.m.), 2,4-dichlorophenoxybutyric acid, and 2,4-dichlorophenoxyacetic acid (1 and 5 p.p.m.).

2436. Treccani, C. P.
Interazione dell'acido α-naftalenacetico e miele nel radicamento di talee di vite. **(The interaction of α-naphthaleneacetic acid and honey in the rooting of vine cuttings.)** [English summary 11 lines.]
Riv. Fruttic., 1950, **12**: 133-62, bibl. 10.

The author gives a detailed account of his experiments at Milan in the years 1947-1949 in which urine, 2,4-D, α-naphthaleneacetic acid and other substances were used in attempts to promote the rooting of woody vine cuttings. The most interesting conclusions reached are: that treatment with naphthaleneacetic acid 10 p.p.m.+honey 10% was the most effective tried and resulted in increased take and growth; that honey increases the effect of the chemicals by reason of the energy provided by its sugars; that honey also increases the resistance of the cells to the hormones by preventing the coagulation of proteins; that soil texture is of the greatest importance to rooting; and that the immersion of the cuttings in water before planting is most desirable.

2437. Treccani, C. P.
Acido α-naftalenacetico ed altri trattamenti nella moltiplicazione per talea della vite, del melo e del pesco. **(The use of α-naphthaleneacetic acid and other materials in the propagation of vine, apple and peach from cuttings.)** [English summary 10 lines.]
Ann. Sper. agrar., 1950, **4** (N.S.), pp. 37-55, bibl. 22.

In these experiments at the Stazione Sperimentale di Ortofrutticoltura at Milan no improvement at all was obtained by the use of α-naphthaleneacetic acid on apple or peach cuttings. With vines its use resulted, not in a higher percentage of rooting, but in a higher percentage of marketable rooted cuttings, the best concentration being 40 p.p.m. Inversion of polarity in vine cuttings for 3 months also resulted in a higher proportion of marketable rooted cuttings. Immersion of the root systems of 1-year-old seedlings in a solution of vitamin B_1 at 10 p.p.m. for 13 or 20 days resulted in a higher ratio of well-rooted plants, i.e. 58% (13 days) and 61% (20 days) as against 31% in controls dipped in water.

2438. Heymann-Herschberg, L.
The effect of synthetic growth substances on the rooting of grape-vine cuttings.
Palest. J. Bot. (*R*), 1949, 7: 113-23, bibl. 21, illus.

Ortho chlorophenoxyacetic acid [ClPhOA] and β-naphthoxyacetic acid [NOA] at several concentrations increased the percentage rooting and produced earlier rooting, better root systems and better subsequent development in the nursery

in cuttings of the rootstocks Solanis × Rupestris 216-3, Chasselas × Berlandieri 41B and Rupestris du Lot, grafted with the variety Dattier. If applied to the apex of the stock as well as the base they induced the formation of strong connecting callus. The favourable effects of the growth substances were relatively more marked out of doors, where rooting of untreated cuttings was poor, than in cuttings kept in a warm room; they were also more marked with 41B, which is more difficult to root than the other stocks. Lanolin proved a more satisfactory carrier of the growth substances than talc. Immersion in warm water or dilute solutions of growth substances gave variable results but increased the rooting percentage in some cases. The same substances tested on olive cuttings improved callus formation slightly but failed to induce rooting.

2439. Heymann-Herschberg, L.
Avena cylinder test of two synthetic growth promoters.
Palest. J. Bot. (*R*), 1949, **7**: 124-5, bibl. 9.

As part of the study on the rooting of vine cuttings described in abstract 2438 above, Thimann's oat cylinder test was applied to NOA and ClPhOA. In both cases clear optimum curves were obtained, the optimum concentration of NOA being 1 to 10 mg. per litre water and of ClPhOA 10 to 100 mg. Thus NOA proved relatively more effective here, as it was too for the rooting of vine cuttings.

2440. de Freitas, A. G. B.
Estudo preliminar da influência da profundidade de plantação no enraizamento da videira. (**A preliminary study of the effect of depth of planting on the rooting of vines.**) [French summary 2½ pp.]
Agron. lusit., 1948, **10**: 175-200, bibl. 8 [received 1950].

Experiments were carried out with vine cuttings planted, some vertically, others obliquely, to a depth with the base 0·1 m. below soil level, and vertically at depths of 0·2, 0·3 and 0·4 m. In clay silt, shallow planting at 0·1 m. was more favourable than at 0·3 and 0·4 m., while the reverse obtained on clayey sand. The number of roots developing at the base of cuttings is affected by the kind of soil as well as by the depth of planting. The total weight of shoots and their branches was influenced by the depth of planting of the cuttings, but the differences had no statistical significance except on clayey sand where Rupestris du Lot planted at 0·4 m. made the best growth.

2441. Turjanskiĭ, G. F.
The development of inflorescences on the grape vine from tissues other than flower buds. [Russian.]
Vinodelie i Vinogradarstvo (Wine-making and viticulture), 1950, No. 7, pp. 17-19, bibl. 3, illus.

An account of the development of inflorescences, extra to those from normal flower buds, on branches and side shoots of the grape vine.

2442. Nègre, E.
Appréciation de la maturité des raisins de table. (**Estimating the maturity of table grapes.**)
Progr. agric. vitic., 1950, **134**: 5-11.

A discussion on the relation S/A (total sugars × 100 : total organic acids), the value for ripe grapes being generally between 20 and 25.

2443. Anon.
The Roadless vineyard model.
Roadless News, 1950, **15**: 17-19, illus.

The production of a narrow version of the standard Roadless Half Track Fordson Major tractor is announced. The new tractor has an over-all width of 50 inches compared with 65 inches in the standard model, but is otherwise similar. It is designed to work in vineyards where the width between rows is about 2 metres.

2444. Najjar, H.
Pruning the grapevine. [Arabic, English summary 8 lines.]
Circ. Ext. Serv. Minist. Agric. Damascus **47**, 1950, pp. 16, illus.

The principles of vine pruning, including the use of renewal spurs, are discussed.

2445. Fleming, H. K., Alderfer, R. B., and Frear, D. E. H.
Effect of fertilization and cultural treatments on growth and yield of Concord grapevines.
Bull. Pa agric. Exp. Stat. **523**, 1950, pp. 25, bibl. 12.

Soil fertilization tests showed no increase in vine growth or yield from the annual spring application of N and K_2O in amounts greater than 20 and 50 lb. per acre, respectively. These results were obtained in a 5-year study, 1944-48, in a young vineyard on Chenango gravelly sandy loam. The addition of boron, manganese, and zinc at the rate of 10 lb. of borax, 30 lb. of zinc sulphate, and 30 lb. of manganese sulphate per acre every third year, to a 25-year-old vineyard on Ottawa loamy fine sand, produced no measurable changes. Application of barnyard manure, stems, and pomace, in amounts equivalent on a dry weight basis to 6 tons of manure every third year, resulted in increased vine growth and yield following the second application of these materials to a 35-year-old vineyard on Chenango gravelly sandy loam. The annual return of the prunings from each vine to the soil over a 5-year period had no measurable effect on the grapevines. Thorough spring and summer cultivation appeared to be the most effective cultural practice in any one year from the standpoint of growth and yield. " Trashy " cultivation by periodic discing to maintain a partial cover of Ladino clover or ryegrass or a mixture of the two on about 25% of the surface, and to leave about half the surface covered with a mulch of dead vegetation, offers promise as a new cultural practice for Erie County, Pennsylvania, where these tests took place.

2446. Upshall, W. H., van Haarlem, J. R., and Kelly, C. B.
Soil-fertilization experiments with the Concord grape.
Rep. Vineland hort. Exp. Stat., Ontario, for 1947 and 1948, pp. 15-29, bibl. 9, illus.

This paper gives a final summary of manurial experiments in the Haines vineyard in the Niagara district of Ontario, covering the period 1929 to 1947 [for period up to 1938, see *H.A.*, 8: 1013]. A comparatively small response was obtained from artificial fertilizers, the

yield increases being insufficient to cover the cost of application. Nitrate of soda used alone was ineffective. Superphosphate gave a significant increase in yield, but this is thought to be largely due to its stimulation of weed growth. The greatest increase was from the NPK combination. Straw plus nitrate of soda, and green manure crops resulted in marked improvement of growth and yield. Chopped legume hay was less effective. Applications of lime, wood ashes and fish manure were of doubtful value. In general, the crop in any given season was determined by the amount of cane growth made in the previous season, provided the vines were pruned in relation to their vigour. Surface applications of superphosphate and potash did not raise the level of available phosphate and potassium in the soil below a depth of 6 in., so deep placement is required where vines show deficiency symptoms. Where there were no organic additions except weeds and vine leaves for 13 years the organic matter content of the soil decreased by 10 to 47%.

2447. DE FERRIÈRE, P. J. J. F.
Climat du sol et alimentation N P K de la vigne en 1947 et 1948. **(Climate and NPK nutrition of vines in 1947 and 1948.)**
Ann. agron., 1950, **1**: 333-42, bibl. 2.

In 1947 a dry spring was followed by a relatively wet summer, and in 1948 a relatively dry summer followed a wet spring. In an attempt to evaluate these climatic influences on the nutrition of vines in the Atlantic region of France leaf analyses were carried out throughout the two seasons. Nitrogen uptake was found to be impeded by both waterlogging and excessive drought, while the uptake of phosphate was benefited by the rains in 1948, drought having an unfavourable effect. In well-drained soils potassium proved to be deficient during a wet season in relation to the supply of nitrogen increased by microbial activity and to available phosphoric acid, whereas during dry periods the roots were capable of absorbing all three elements in their proper balance. Potassium manuring, it is concluded, is particularly necessary in wet seasons and in humid soils, the plant being in greatest need of this nutrient during the phase of vigorous growth in spring and during the period of berry ripening.

2448. LEFÈVRE, G., AND BLANC-AICARD, D.
Considérations sur le compostage et l'emploi du marc de raisin comme amendement organique. **(On the composting of grape residue and its use as an organic soil amendment.)**
Ann. agron., 1950, **1**: 351-61, bibl. 11.

Experiments showed that about 50% of the organic contents of grape residue are lost in the process of composting. The application of fresh residue is therefore preferable in vine soils with sufficient microbial activity to guarantee its rapid decomposition. The addition of N was even found to be unnecessary in some soils, though it proved beneficial in others. For most of the vine soils in France, however, previous composting cannot be avoided, but in view of the abundant supply of grape residue the loss of organic matter involved is economically unimportant. The method of composting is described and analytical data are tabulated.—Station Agronomique et de Biochimie Végétale, Antibes.

2449. MENAGARIŠVILI, A. D., AND LEŽAVA, V. V.
The effect of applying microelements in vineyards. [Russian.]
Vinodelie i Vinogradarstvo (Wine-making and viticulture), 1950, No. 6, pp. 16-17.

The addition of boron and manganese to NPK fertilizer improved the quality of grapes grown in the carbonaceous soils of Georgia. In these experiments the addition of boron slightly increased the yield, that of manganese reduced it.

Nuts.

(*See also* 3375, 3381, 3417.)

2450. TROTTER, A.
Le principali varietà di noccioli (*Corylus*) coltivati nella Campania, I e II. **(The chief varieties of hazel nuts grown in Campania, I and II.** [Short English summaries.]
Ann. Sper. agrar., 1949, **3** (N.S.): 809-42, 1125-52, bibl. 40, illus.

The author gives a very full account of the characteristics of varieties of the three chief hazel nut stocks in Campania, Southern Italy, and a key to their identification. Thirteen varieties are illustrated in colour. He states that Campania was the first Mediterranean region in which the cultivation of hazels was established. The stocks described are: (1) *Corylus avellana* L.s.l. of which 8 chief varieties and 15 sub-varieties are described; (2) *C. maxima* Mill., two only being described and these merely for their genetical importance; and (3) *C. avellana*×*maxima* (=*C. mediterranea* Trotter) includes 8 chief varieties and 6 sub-varieties.

2451. HENDRICKSON, A. H., AND VEIHMEYER, F. J.
Irrigation of walnut orchards.
Calif. Agric., 1949, **3**, No. 7, pp. 11, 14, from abstr. in *Soils and Ferts*, 1950, **13**: 1182.

Three irrigations (two before and one after harvest) which wetted the soil to a depth of 7-8 ft. were satisfactory for a Californian loam.

Noted.

2452.

a JONES, T. H.
Varieties of small fruits adapted to Tennessee.
Fruit Var. hort. Dig., 1950, **5**: 17-22, illus.

b KÁRPÁTI, Z.
Hazai cornusaink vadontermö és kerti változatal. **(Hungarian *Cornus* varieties.)** [German text 2 pp.]
Bull. Fac. Hort. Buda., 1949, **13**: 114-26, bibl. 17, illus.

c LEYVRAZ, H.
Quelques recommandations en vue de la reconstitution et de l'encépagement du vignoble dans le Valais central. **(Replanting a vineyard in the central Valais, Switzerland.)**
Rev. romande Agric. Vitic., 1950, **6**: 19-21.
Rootstocks and both white and red varieties.

d LEYVRAZ, H.
Ébourgeonnement de la vigne. **(Vine pruning.)**
Rev. romande Agric. Vitic., 1950, **6**: 35-7, illus.

PLANT PROTECTION OF DECIDUOUS FRUITS.

General.

(*See also* 3439.)

2453. STATENS PLANTEPATOLOGISKE FORSØG.
Plantesygdomme i Danmark 1947. **(Plant diseases and pests in Denmark 1947.)** [English summary pp. 9½.)
Tidsskr. Planteavl, 1950, **53**: 185-234.
The survey, which has been compiled by members of the Danish Plant Pathology Service, includes notes on diseases and pests of fruit, vegetables, potatoes and ornamentals.

2454. BRATLEY, C. O., AND WIANT, J. S.
Diseases of fruits and vegetables found on the market, and means of controlling them.
Econ. Bot., 1950, **4**: 177-91, bibl. 3.
Studies on losses resulting from market diseases in U.S. are quoted. Diseases are classified into parasitic, mainly fungal; non-parasitic, such as apple scald; and injuries caused by bruising, freezing and chemical agencies. Control of such diseases must begin in the field, continue after harvest and conclude with the use of appropriate temperatures and atmospheres in transit and at the retailer.

2455. DARPOUX, H.
Les avertissements agricoles. **(Pest and disease warnings in agriculture.)**
Publ. Stat. cent. Path. veg. **B.T.I.41-1949**, 1949, pp. 9, bibl. 30, illus.
An account of the methods adopted in France with reference to vine mildew (*Plasmopara viticola*) and apple and pear scab (*Venturia inaequalis* and *V. pirina*).

2456. STEVENS, R. B., AND OTHERS.
Plant disease forecasting: a symposium.
Plant Dis. Reptr. Suppl. **190**, 1950, pp. 33.
The symposium consists of 5 articles by different authors entitled: Early steps in plant disease forecasting in the United States; Validity and value of plant disease forecasting; Three years' experience forecasting late blight in Tidewater, Virginia; Spore traps as an aid in forecasting several downy mildew type diseases; and The influence of climate on the development and spread of *Phytophthora infestans* in artificially inoculated potato plots.

2457. ZWINTZSCHER, M.
Obstzüchtung und Schädlingsbekämpfung. **(Fruit breeding and pest and disease control.)**
Höfchen Briefe, 1950, **3**: 3: 15-30, illus.
The main objective at the Max Planck Research Institute (Erwin Baur Institute), Voldagsen, is an increase in yield of the existing fruit varieties, and development of new, frost and disease resistant varieties. The stages reached and methods employed are discussed.

2458. ANON.
Nation's horticultural research centre.
Amer. Nurserym., 1950, **92**: 2: 15, 121-9.
In this general account of the organization and work of the U.S.D.A. Agricultural Research Administration at Beltsville, Md, brief mention is made of the study of the possible applications of ultrasonics to horticulture, a study of which is being carried out there. The possibility of controlling fruit fly on citrus and of killing various types of larvae by ultrasonic sterilization is being investigated. Tests also indicate that treatment with ultrasonics will reduce the germination period of certain seeds and tubers.

Disturbances of nutrition or of unknown origin.

2459. GALLAY, R., AND STALÉ, J.
Observations sur le dépérissement des fraisières du Valais. **(The decline of strawberry plantations in the Valais.)**
Rev. romande Agric. Vitic., 1949, **5**: 69-70.
A serious decline in strawberries in the Swiss canton of the Valais became quite general in certain regions in 1949. The symptoms in Madame Moutot are as follows: After a magnificent blossoming the plants lose their vigour and do not develop any further. The leaves change colour, become necrotic and dry up, while the roots are black and brittle and develop no fresh rootlets. Where some recovery takes place in July in the less severely affected plants, it benefits the runners rather than the parent plant. Possibly the decline is due to several independent causes, and the authors, members of the Lausanne research station staff, put forward the following hypotheses: (1) Degeneration due to prolonged propagation from runners of the same origin. The importance of the source of the planting material became evident when strawberries from the mountains were grown in the plains adjacent to plants raised from plain cultures. It is suggested that the mountain strawberries are more resistant to detrimental environmental conditions, though the possibility of virus infection is also mentioned. (2) A high content in the soil of various salts which rise from the subsoil with the evaporation water. Certain observations point to the conclusion that a reduction in soil evaporation might prevent the trouble. (3) Bad manurial and plant protection practices. Several experiments—manurial, cultural and shading—are under way to determine the nature of the trouble. Apparently a consideration of the virus hypothesis is not contemplated.

2460. WENZL, H.
Weitere Untersuchungen über die Sternfleckenkrankheit der Marille (*Prunus armeniaca*). **(Star spot of apricot.)** [English summary 9 lines.]
PflSch. Ber. Wien, 1950, **4**: 180-6, bibl. 5.
A further experimental study of curly leaf or star spot of apricot, carried out for 5 years in a Viennese nursery, confirmed the author's earlier view (*H.A.*, 14: 555) that the disease is not of virus origin. The results clearly indicate that the trouble is associated with severe pruning. It appears to be identical with asteroid spot of myrobalan plum described by E. M. Hildebrand (*H.A.*, 15: 554).

2461. MÁNDY, G.
Körtegyümölcs-rendellenességek. **(Irregularities of pear fruits.)** [German summary 4 lines.]
Bull. Fac. Hort. Buda., 1949, **13**: 87-8, bibl. 3, illus.

A brief survey of the literature on pear malformations with descriptions and illustrations of deformed fruits found near Budapest.

2462. WENZL, H.
Untersuchungen über die Absterbeerscheinungen an Marille (*Prunus armeniaca*). **(Die-back of apricots.)** [English summary ¾ p.]
PflSch. Ber. Wien, 1950, **4**: 187-200, bibl. 10.

In a three-year study of "apoplexy" of apricots no relationship was found to exist between "sudden death" and (*a*) *Monilia laxa* incidence; (*b*) frost damage; (*c*) mechanical injury; and (*d*) *Cytospora cincta* infection. Wounds were found to cause gradual die-back of tips, while *Cytospora* infection of wounds on dying branches caused gumming and led to a rapid spread of the fungus. Trees that were to succumb the following year, entirely or partly, showed increased sucker formation from the myrobalan rootstock. Four types of die-back were observed in Austria: (1) Sudden death of the whole tree or of several limbs associated with the cutting off of the sap stream at the base of the branches. This is the type occurring most frequently. (2) Gradual die-back of the tips associated with lack of vigour, caused by wounds. (3) Die-back of the tips caused by flower or fruit infection. (4) Die-back of parts of branches above cankerous wounds at the base of lateral shoots associated with new growth below the wound. The last type is rare.

2463. THOMPSON, A. H., AND BATJER, L. P.
Effect of various soil treatments for correcting arsenic injury of peach trees.
Soil Sci., 1950, **69**: 281-90, bibl. 10, illus.

Doubling the application of nitrogen ordinarily used on peach trees reduced arsenic toxicity injury. An application of zinc sulphate combined with high nitrogen fertilization almost completely corrected it in some instances. Ferrous sulphate was not so effective as zinc sulphate.—U.S. Dep. Agric., Wenatchee, Washington.

2464. HEINICKE, A. J.
What causes stippen [bitter pit] and what can be done about it.
Proc. 95th annu. Mtg N.Y. St. hort. Soc., 1950, pp. 178-83.

The author holds the fairly generally held opinion that bitter pit is not caused by insects or fungal disease or by boron deficiency.* He recommends prompt and proper storage and the avoidance of cultural conditions promoting over-vigorous growth. Pruners should be careful to remove the weak and shaded wood which tends to produce pitted fruits.

2465. BURRELL, A. B.
Occurrence and control of boron* deficiency of apple.
Proc. 95th annu. Mtg N.Y. St. hort. Soc., 1950, pp. 284-91.

After noting how the symptoms of internal cork can be differentiated from those of bitter pit the author discusses the incidence of this boron-deficiency phenomenon and suggests that the application of borax to the soil once in three years in early spring affords an easy and cheap remedy.

* Mulder in Holland gives reasons for believing that both bitter pit and internal cork are boron deficiency diseases, internal cork being due to early and bitter pit to late boron deficiency. See *H.A.*, 18: 1723.

2466. LENANDER, S.-E.
Några bristsjukdomars inverkan på körsbärsträd. **(Boron deficiency in cherries.)** [English summary ¾ p.]
Sver. pomol. Fören. Årsskr., 1949, **50**: 172-83, bibl. 19, illus.

At Rånna Research Station, Sweden, trees of the sour cherry variety Stora Klarbär made little or no extension growth and the young shoots were bare except for small leaves at the tips. The fruits were on short stalks, small, and with dark, brown scars. Other sour cherry varieties showed similar, though less severe, symptoms, whereas two Bigarreau varieties growing on the same plot had an almost healthy appearance. An application of borax in the autumn of 1946 at the rate of 50 g. per tree brought about a marked improvement in 1947 which was maintained in 1948. The symptoms, however, reappeared the following summer. The response of the trees to borax suggests that the trouble is due to boron deficiency.

2467. PODUFALYĬ, T. I.
Controlling chlorosis of apple and pear. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 4, pp. 31-4.

Chlorosis of apple and pear trees is serious in the Crimea where it is associated with poor physical properties of the soil, abnormal water relations and excess lime. Experiments were carried out with the object of controlling chlorosis by sowing lucerne in the orchards so as to improve soil conditions. The permeability of the soil was increased 41%, the dry mass of the leaves 59%, and, as a result of the control of chlorosis, the yield of the trees 4·6 times.

2468. MUSKETT, A. E.
Copper deficiency disease of apple trees.
Nature, 1950, **165**: 900-1, bibl. 2.

In the early 1920's 6,000 acres of Bramley's Seedling in two counties of Northern Ireland were in an extremely poor condition. At that time no regular spraying programme was in operation. When scab appeared and lime-sulphur and bordeaux mixture were tried for its control, trees sprayed with the copper fungicide burst into new and vigorous growth, whereas lime-sulphur only controlled the disease but did not affect the general condition of the trees. It is suggested that the large increase in crop and the marked improvement in health resulting from applications of bordeaux mixture were due to the correction of a copper deficiency.

2469. BOULD, C., AND OTHERS.
Copper deficiency of fruit trees in Britain.
Nature, 1950, **165**: 920-1, bibl. 10.

A serious failure of apple trees occurring at Wisley in 1948 was shown by the authors to be due to zinc deficiency (see *ibidem*, 1949, 164: 801-2; *H.A.*, 20: 124). Another form of die-back observed on the same plot was investigated in 1948 and 1949 and was diagnosed as resulting from copper deficiency. "The first symptoms appeared in early July on the terminal

leaves of current-year shoots in the form of large irregular necrotic areas, and these were followed by upward curling and distortion of the leaves. The lower leaves on affected shoots were usually pale green, and sometimes exhibited numerous small irregular necrotic spots. Towards the end of July, the shoots began to shed their leaves from the tip downwards, and from September onwards they began to wither and die." Two half-standard trees of the variety Gloucester Cross on M. XII were selected for treatment, because they had suffered from severe die-back for several years. On 6 July some branches were sprayed with 0·1% copper sulphate and others injected with this material in powdered form. In the first place the spray caused some localized damage, but at the end of the season the shoots were vigorous and healthy, whereas the solid injection improved the condition only slightly in 1948. In the following season a slight residual effect was noted from the foliage spray, while shoots on injected branches were very vigorous, carrying healthy leaves and showing no symptoms of die-back. In a second experiment started in 1949 on one of Crane's seedlings on M. XII, all the treatments—soil application of $CuSO_4$ (½ lb. per tree), injection and dormant spray—proved effective in controlling the symptoms. Leaf analyses, data of which are tabulated, show that the critical value for leaves from the middle region of terminal shoots appears to be below 5 μg. copper per g. of dry matter. Observations that comparable trees on M. I and II were less affected by the trouble seem to suggest that M. XII is particularly susceptible to copper deficiency. This is believed to be the first recorded instance of this malady in fruit trees in Great Britain.

2470. Bould, C., and others.
Zinc and copper deficiency of fruit trees.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 45-9, bibl. 6, illus.

The symptoms of zinc and copper deficiency in apples and pears as recorded at Wisley are described and soil data for the two elements from healthy and deficiency areas are given [see also *H.A.*, 20: 124, and abstract 2469 above]. Zn deficiency does not appear to be especially associated with any particular rootstock, but trees on M. XII appear to be much more susceptible to Cu deficiency than trees on M. I or II. Tentative methods suggested for controlling Zn deficiency are injection of solid zinc sulphate during the dormant season, a dormant spray of 4% zinc sulphate in February or a 0·1 to 0·2% spray at petal fall or shortly afterwards. With Cu deficiency, responses have been obtained to injection with solid copper sulphate and to foliage sprays of 4 : 4 : 50 bordeaux mixture; other methods are also being tested.

2471. Pichler, F.
Untersuchungen über Magnesiumstaubschäden an Pflanzen im Laboratorium. **(Laboratory tests on magnesium dust injury to plants.)** [English summary ½ p.]
PflSch. Ber. Wien, 1950, **4**: 169-79, bibl. 7.

Deposits of a dust containing magnesium in the vicinity of magnesia works in Austria cause damage to agricultural plants. Using the " Wurzelbild " (root picture) test, in which the development of rye seedling roots is evaluated through the bottom of a Petri dish, toxicity in soil samples was shown to decrease with distance from the chimney (100-400 m.). By the same method it was shown that different Mg compounds with the same Mg content vary in toxicity, root injury increasing with the following order of anions: $HPO_4 < CO_3 < SO_4 < Cl < HCO_3 < NO_3 < O < OH$. While the damage caused by the dust in loam soils was heavy, no root injury was noticed in peat soil. This accounts for the observation that the addition of peat to the soil counteracts the toxic effect of Mg dust. Calcium salts, especially calcium sulphate, were also found to have a beneficial action.—Bundesanst. f. Pflanzenschutz, Vienna.

2472. Barker, B. T. P., Hewitt, E. J., and Nicholas, D. J. D.
Studies on cider sickness. I. The molybdenum content of ciders in relation to the incidence of cider sickness.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 145-53, bibl. 2.

Determination of the Mo content in 23 samples of cider by direct chemical analysis and the *Aspergillus niger* bioassay method gave generally very similar results. The cider with the highest content contained 0·015 and 0·02 p.p.m. as shown by the respective methods, and that with the lowest content 0·0007 and 0·001 p.p.m. respectively. Comparisons of the ciders of individual apple varieties from centres in Somerset, Hereford and Kent suggest that the quantity of Mo in the juice is related to the soil conditions at those places. Sickness tests under 6 different forms of treatment are described, sterilization by heat treatment prior to direct infection being outstanding. There was no apparent correlation between the Mo contents of the ciders and their behaviour in the sickness tests.

2473. Chabannes, J., Trocmé, S., and Barbier, G.
Observations sur la carence zincique du pommier. **(Observations on zinc deficiency in apples.)**
Ann. agron., 1950, **1**: 362-7, bibl. 8.

Zinc deficiency in Calville apples was observed at Versailles, the most characteristic symptom being that the buds give rise to leaf rosettes instead of shoots. These leaves are much smaller and narrower than usual, of a dull green and with a wavy margin. Spraying with 5% zinc sulphate on 15 March, 1949, just before bud burst, brought about a considerable improvement, while a soil application was ineffective. Methods of zinc estimation are discussed and data on the zinc content of leaves of diseased and healthy trees are tabulated.

Climatic factors.

(*See also* 2373, 3104-3106, 3392.)

2474. Luchetti, G., and Maccanti, M.
Osservazioni fisiopatologiche circa lo " spacco delle mele sull'albero ". **(Observations on the physiology of the cracking of apples on the tree.)**
Not. Mal. Piante, 1950, No. 9, pp. 1-6, bibl. 3.

Types of cracking are noted and its incidence is described in relation to varieties, stage of development and sugar content, and weather conditions. [See also next abstract.]

2475. Luchetti, G., and Maccanti, M.
Sullo spacco delle mele sull'albero. **(Cracking of apples on the tree.)**
Riv. Ortoflorofrutt. ital., 1950, **34**: 69-81, bibl. 12.

The authors describe the serious incidence in the Province of Ferrara in 1949 of cracking in apple fruits. This occurred in all varieties and not merely in those which normally show it, such as Rambour Frank. Whole and cracked apples were analysed for their sugar content and the results are tabulated. He concludes that the reasons for cracking were essentially different from those applying to Stayman Winesap apples observed by Verner [*J. agric. Res.*, 51: 191-222 *H.A.*, 6: 26]. The incidence on, not one, but all varieties and the high percentage of fruit damaged are related to environmental conditions in 1949, which were: (1) pronounced spring and summer drought, (2) high average temperature, and (3) almost continuous insolation, all of which tend to induce high sugar concentrations in the fruit. Cracking does not always depend on epidermic lesions, but occurs in fruits in which osmotic pressure rises beyond a limit which varies from fruit to fruit and is the mechanical limit of resistance of the tissues. Cracking takes place not necessarily at the point of greatest osmotic pressure but at the point of lowest mechanical tissue resistance. Again in the Ferrara observations and contrary to Verner's experience cracking takes place only when complete maturity has been reached, and hence when the sugar content is at its maximum. The ultimate cause is water absorption which can be effected through the roots or the epidermis. If it is through the roots, the breaking of the fruits would appear to be due, not to the hydraulic pressure of the ascending sap, but entirely to internal osmotic pressure in the fruit and to the water suction brought about by it. The effect of rain is therefore to make the air more humid: this causes leaf transpiration to stop, which in turn induces a larger supply of water in the passages of the stem and branches for easy transport to the fruit.

2476. Fritzsche, R.
Einige dieses Jahr häufig auftretende physiologische Störungen bei Kernobstbäumen. **(Physiological troubles of pome fruit trees occurring frequently in 1950 [in Switzerland].)**
Schweiz. Z. Obst- u. Weinb., 1950, **59**: 312-15, illus.

The illustrations show (1) skin cracking in apples—especially Boskoop and two other varieties—caused by a stand-still in growth during a drought period and subsequent rapid development after rainfall; (2) sun scald in apples and pears favoured by spraying; (3) internal cork in apple (4 varieties) believed to be due to boron deficiency resulting from the reduced uptake of nutrients during the drought (see *H.A.*, 20: 666).

2477. Hogg, W. H.
Frequency of radiation and wind frosts during spring in Kent.
Met. Mag., 1950, **79**: 42-9.

Since some protection can be given against radiation frosts but not against wind frost, apart from the use of shelter to reduce convective heat loss from the buds and blossom, it is important to know what proportion of frosts are wind frosts. The data bearing on this point from all available stations in Kent have been examined for the 30-year period 1919-38 and are here tabulated for March, April and May. The stations are variously situated on hill-tops, hill-sides, in valleys and on the coast.

2478. Leyvraz, H.
Gel de la vigne. **(Frost damage to vines.)**
Rev. romande Agric. Vitic., 1950, **6**: 37-8.

Deals chiefly with pruning after frost damage. In the case of a severe check young vines of up to 4-5 years will benefit from an application of nitrogen and potassium, if they have not been manured that spring.

2479. Modlibowska, I., and Glenn, E. M.
Notes on frost damage symptoms on fruits in 1949.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 69-70, illus.

Blemishes caused by frost are recorded for apple, pear, quince, cherry and plum fruits, walnut flower buds, and flowers of raspberry and strawberry.

2480. Granhall, I., and Oldén, E. J.
Orienterande frysningsförsök med fruktträdsgrenar vid Balsgård vintern 1948-49. **(Balsgård freezing trials with twigs of fruit trees in the winter of 1948-49.)** [English summary ¾ p.]
Sver. pomol. Fören. Årsskr., 1949, **50**: 137-57, illus.

Artificial freezing trials with twigs from many fruit varieties were carried out in February 1949 in the new freezing laboratory of the Balsgård Fruit Breeding Institute. The present report covers only apples and pears which were divided into two lots each. Apples were exposed for 24 hours to two different temperatures, viz. −31° and −36° C., while only one temperature was applied to pears, viz. −25° C., but for different periods of 24 and 48 hours. After completion of the treatment the twigs were forced and the damage to wood and buds was assessed according to severity (in 6 classes from 0 to 5). The tabulated results show very marked differences between varieties as regards extent and localization of the injury sustained. About 30 new selections of apples from Balsgård were tested in comparison with commercial varieties; 26 of these were tetraploids, and 5 other tetraploids (from Dr. Emil Johansson, Alnarp) were also included. Three diploid selections and two tetraploids were comparatively hardy. The other tetraploids were only medium hardy or sensitive. The results of the artificial freezing trials agree surprisingly well with Swedish field observations. There are a few deviations which need further investigation. It is, however, quite clear that the trials can serve as a very good pointer in the selection and testing of new fruit varieties. [Authors' summary.] The freezing chambers and the various types of damage observed are illustrated by photographs.

2481. Müller, E.
Frostgürtel an jungen Birnen. **(Frost rings on young pear fruits.)**
Schweiz. Z. Obst- u. Weinb., 1950, **59**: 276-7, illus.

A photograph shows two young pear fruits with a "frost ring", i.e. a lighter-coloured ring of slightly

corky epidermis tissue. The injury was caused by a frost in April which damaged the gynaecium after fertilization.

2482. Bergh, F.
Formation of ice in tissues in freezing foods.
Publ. Danish Refrig. Res. Lab. **9**, 1948, pp. 28, bibl. 55 [received 1950].
The technique used in this investigation—the mounting of a special freezing chamber on the stage of the microscope—and the observations recorded on ice formation in the flesh of tomatoes and beetroots may be of interest to those working on frost problems.

2483. Rogers, W. S., and Modlibowska, I.
Low temperature injury to fruit blossom. III. Water sprinkling as an anti-frost measure.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 63-8, bibl. 3, illus.
Experiments have shown that continuous sprinkling of fruit tree blossoms with water during spring frosts can protect them from freezing and does not cause injury. The use of overhead irrigation apparatus as a frost control measure on a limited scale appears practicable.

2484. Mandigo, J. H.
Small fruits thrive on water.
Amer. Fruit Gr, 1950, **70**: 6: 16, 30-2.
After discussing the water requirements of various small fruits in the important production area of south-western Michigan an account is given of the latest observations by growers on irrigation as a means of frost protection for strawberries. Preliminary experiments by a progressive grower in 1948 led to a more general adoption of the practice in 1949 from which the following recommendations emerge: (1) Use small-capacity sprinklers but cover all areas of the field. (2) Start irrigating when the temperature gets down to 34°. (3) Continue to apply water until the temperature has risen above 32°. (Many growers feel they should apply water until the ice coating is all melted.) (4) Use water from the well or lake, as temperature has little or no effect on frost prevention. During the last of the 4 severe spring frosts in 1949 the temperature dropped to 23°, but no damage was done to the bloom where continual irrigation was used during the cold spell, although ½ in. of ice formed on blossoms and leaves.

2485. Leyvraz, H.
Vignobles grêlés. **(Hail damage to vineyards.)**
Rev. romande Agric. Vitic., 1950, **6**: 57-9, illus.
Following severe damage by frost in the spring of 1950, resulting in a loss of about 16 million kg. grapes, the vineyards of southern Switzerland were ravaged by hail between the 22nd May and 1st July. The extent of the injury is assessed and the merits of a compulsory hail insurance scheme are stressed. Advice is given on spraying, pruning and manuring the hail-damaged vines.

2486. Douarche, L.
La lotta contro la grandine in Francia. **(The control of hail in France.)**
Humus, 1949, No. 5, pp. 18-19.
A short account of the hail prevention methods devised by General Ruby and used by co-operating viticulturists in Burgundy. Rockets are fired which explode a weight of 300 to 500 g. jeddite [? cheddite] at a height of 1,000 to 1,200 metres producing a disturbance which affects the atmosphere at a height of 3,000 to 5,000 metres. Their physical action suffices indirectly to disintegrate the hail which is thereupon deposited in a partly melted state. The national meteorological office through its central station at Longwy near Dijon is in continuous touch with 55 minor posts in the district as well as with the Beaune viticultural station. The 75 batteries placed [in 1949] at appropriate spots in the vine district were furnished with rockets of various calibre suitable for use according to whether the threatening clouds were high or low. Their maximum range, hitherto some 1,000 metres, is likely to be raised to 1,500 in the near future.

2487. Molinier, R., and Tallon, G.
Aperçu sur la végétation de la Vallée du Vistre (Gard). **(Observations on the vegetation in the Vistre valley, Gard, France.)**
Ann. agron., 1950, **1**: 204-11.
In their study of the Vistre valley the authors encountered widespread chlorosis in fruit trees caused by waterlogging due to frequent inundations. Vines did well under these conditions but mildew incidence was found to be higher than in vineyards on the slopes of the valley or on adjacent hills. Regulation of the river and drainage are suggested as counter measures.

2488. Dominion Forest Service.
The Province of Manitoba shelter belts and the farm woodlot.
[*Publ.*] *Dominion Forest Serv., Dep. Mines nat. Res.*, undated,* pp. 50, bibl. 7, illus.
Deals with the protection of prairie homes and gardens by shelter belts. Planting and care of the belts are described and 27 species of trees, including some ornamental and shade trees, are discussed.

2489. Petrahilev, I. M.
Shelter belts in Minurinsk orchards. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 4, pp. 7-13.
The continental climate of the Minurinsk region (Siberia) is unfavourable for horticulture because of severe frosts, high winds, dry air, and insufficient rain and snow. In unsheltered orchards the severe south-west winds not only blow away the protective snow but damage trees by preventing normal development and breaking branches; they also hinder pollination, tear off flowers, leaves and fruit, and dry up trees and soil. Shelter belts denser than those in European regions are therefore needed. To obtain this density the trees of the shelter belts are grown at three heights. The tallest trees are pine, larch, poplar, birch and elm. Of medium height are Siberian crab, yellow acacia, maple, hawthorn, bird cherry [*Prunus padus*], amelanchier, pear, plum, and rennet apples. Below are shrubs such as the local gooseberry, black currant, hazel, dog-rose, and cornel [*Cornus mas*]. Notes on some of these forms are given.

* Possibly 1938, received 1950.

2490. Mašinskaja, L. P.
Protective woodland strips in vineyards. [Russian.]
Vinodelie i Vinogradarstvo (Wine-making and viticulture), 1950, No. 6, pp. 22-4, illus.

It is recommended that windbreaks round the vineyards should be planted in rectangles of approximately 500 m. × 200 m. at least 10 m. distance from the nearest row of vines. Trees suitable for windbreaks include oak, varieties of maple, gleditschia, ash and pear, while shrubs listed are willow, yellow acacia, golden currant and privet. The inside of the protective strips can be planted with local varieties of pear, apple, mulberry, apricot, currant or nut. To keep a neat hedge around the whole vineyard area, one or two rows of gleditschias, planted along the outer fringe of woodland strips, are trimmed yearly.

Viruses.

(*See also* 3019, 3441.)

2491. Robiony, D.
I virus vegetali. **(Plant viruses.)**
Ital. agric., 1950, **87**: 217-23, bibl. 10.

A general account of plant viruses according to the theories of various workers, with particular reference to the virus proteins, their properties and methods of isolation.

2492. Kennedy, J. S.
Aphid migration and the spread of plant viruses.
Nature, 1950, **165**: 1024-5, bibl. 5.

From his own observations and those of others the author concludes: " The key considerations affecting the virus-spreading efficiency of a given aphid species are its ability to transmit the virus, and the abundance and activity of its winged forms, rather than its potentialities as a direct pest of the crop. . . . Among the winged aphids available and capable of transmitting the virus, those species also capable of becoming serious pests would be at some disadvantage, as virus-spreaders, compared with species less well adapted to the given plants. Those kinds or conditions of plants which were more susceptible to colonization by virus-transmitting aphids would have some advantage, in resisting virus spread, over plants more resistant to colonization. These points may be worth keeping in mind not only when seeking the insect vectors of plant virus diseases, but also when seeking to control the diseases by cultural or plant-breeding methods."

2493. Prentice, I. W.
Experiments on rubbery wood disease of apple trees. A progress report.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 122-5, bibl. 6, illus.

The results as assessed by hand bending and by incomplete lignification of the wood (as shown in stained sections—see *H.A.*, 15: 1561) are interpreted as supporting the view that rubbery wood, a disease of apples, particularly the variety Lord Lambourne, is caused by a virus.

2494. Luckwill, L. C., and Crowdy, S. H.
Virus diseases of fruit trees. II. Observations on rubbery wood, chat fruit, and mosaic in apples. Progress report.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 68-79, bibl. 12, illus.

This report deals with observations made during the past 5 years on rubbery wood, mosaic and chat fruit in apples with particular reference to the variety Lord Lambourne. The symptoms and host ranges of the diseases are described. [For earlier accounts, see *H.A.*, 15: 92, 549 and 1024.] Rubbery wood, like mosaic, can be transmitted by grafting and is systemic in trees of both immune and susceptible varieties. It is therefore a virus disease. Chat fruit, too, is probably transmissible by grafting, but the evidence is not yet as conclusive as for rubbery wood or mosaic. Rubbery wood and mosaic, and probably also chat fruit, have a natural method of spread in the orchard. Healthy Lord Lambourne budded on Malling clonal rootstocks showed a large percentage of rubbery trees two years after budding. Only M. II gave a completely healthy stand of trees. Certain varieties of apple, tolerant to rubbery wood and chat fruit, can be successfully headworked on to infected Lord Lambourne trees. Trees infected with mosaic should be destroyed. The above results are discussed in relation to current views on the nature of virus diseases. [From authors' summary.]

2495. Catoni, G.
Deperimenti e moria dei peri nella Venezia Tridentina. **(Dieback of pears in Venezia Tridentina.)**
Agric. Venezie, 1947, **1**: 154-61 [received 1950].

An earlier note on a very serious phenomenon in pears in north-east Italy which was reported on by a commission of investigation in 1949 [see *Not. Mal. Piante*, 1949, No. 4; *H.A.*, 20: 133]. Indirect evidence now points to virus origin, though in this earlier article drought appears to have been the chief suspect.

2496. Willison, R. S.
Virus diseases of fruit trees. I. Some field observations on virus-like symptoms on stone fruit in Southern England.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 64-7, bibl. 5.

Symptoms of apparent virus infections observed on cherries, plums and a few peaches are described.

2497. Crowdy, S. H., and Luckwill, L. C.
Virus diseases of fruit trees. III. A preliminary note on stunt of plums.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 80-1, bibl. 1, illus.

An abnormal habit of growth referred to as " stunt " and described here has been observed in trees of Bountiful, Giant Prune, Evesham Wonder, Thames Cross and possibly Yellow Pershore and Victoria in different parts of southern England. Characteristic symptoms developed in seedling peaches and cherry rootstock F.12/1 when these were budded with Bountiful and Giant Prune buds taken from trees showing " stunt ".

2498. Albert, A. R.
Cherry curl leaf.
Wis. Hort., 1950, **40**: 219-20, illus.

A 66% recovery from cherry curl disease was achieved in Wisconsin on 27 trees, with fresh straw mulch plus 0-9-27 fertilizer, 22 months after treatment. [See also *H.A.*, 20: 685.]

2499. BLUMER, S.
Viruskrankheiten an Kirschbäumen im Gebiete des Zürichsees. **(Virus diseases of cherry trees around Lake Zürich.)**
Schweiz. Z. Obst- u. Weinb., 1950, **59**: 286-91, illus.

As the symptom expression of the Pfeffingen disease prevalent in the Basle area differs with the variety, it is as yet difficult to tell whether the diseased cherry trees found in the Zürich district are infected by the same virus. The chief differences are that in the Basle area the trouble is more deadly and a high percentage of the trees is affected, while around Lake Zürich few diseased trees have been found and these show only relatively mild symptoms. In some respects the malady in the Zürich district is reminiscent of rasp leaf of sweet cherries encountered in the western United States. Photographs illustrate both the leaf symptoms and the bare branches of an affected tree, and a map shows the distribution of the disease around the lake.

2500. BRUER, H. L., PERSONS, T. D., AND TURNER, W. F.
Phony disease of peaches, its cause and control.
[*Leafl.*] *U.S. Dep. Agric., Agric. Res. Administ. Bur. Ent. Plant Quar.* **PA-110**, 1950, pp. 7.

The distribution of phony peach disease in the United States, the damage it causes and the manner of its transmission are described. Four species of leafhopper are vectors of the virus; they may be killed with DDT spray, but to wipe them out or materially reduce their numbers would be difficult. Experiments with DDT spray in spring and autumn are, however, giving promising results. Phony disease can be controlled by careful annual inspection of the orchards, followed by the removal of all infected trees.

2501. CIFERRI, R.
Segnalazione della malattia virosica della " pesca verrucosa " in Italia. **(Peach wart recorded in Italy.)**
Not. Mal. Piante, 1950, No. 10, pp. 43-5, bibl. 33.

A disease of peach trees in Italy is similar to one previously described by Blodgett in America as peach wart [*H.A.*, 13: 424; 16: 1887].

2502. BIRAGHI, A.
Una probabile nuova virosi del pesco. **(A new peach virus ?)** [English summary 6 lines.]
Ann. Sper. agrar., 1950, **4** (N.S.): 103-7.

In a disease which has appeared in a peach district of the province of Savona the first stages are a partial discoloration of the leaves at the margins, leaving the centre normal. This is followed by stunting of the internodes and finally by the death of the affected branches. Death gradually spreads to the whole. Its origin, thought to be virus, will be determined by grafting.

2503. GALLAY, R., AND OTHERS.
La dégénérescence infectieuse existe-t-elle dans notre vignoble ? **(Are there cases of infectious degeneration in Swiss vineyards ?)**
Rev. romande Agric. Vitic., 1950, **6**: 43-5, bibl. 1, illus.

Symptoms encountered in two vineyards in French-speaking Switzerland resemble those described as characteristic of court-noué. Experiments carried out with all precautions in different localities show that the trouble is graft-transmissible. On the basis of this evidence the authors align themselves with Branas' conception of the infectious nature of this degeneration, though they consider their conclusions as preliminary. The symptoms are illustrated and the experimental data are tabulated.

Bacteria.

2504. WEBB, P. C. R.
Bacterial infection of fruiting spurs of sweet cherry (*Pseudomonas mors-prunorum* Wormald and *P. prunicola* Wormald).
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 120-1, bibl. 3, illus.

Bacterial infection of the fruiting spurs of sweet cherry often gives rise to stem cankers on nursery material and branch cankers on both young and older trees. Under conditions of high and prolonged humidity bacteria emerge from such spurs and viable bacteria have been isolated from surfaces which had received 6-9-100 bordeaux spray three weeks previously.

2505. PARKER, K. G., AND BURKHOLDER, W. H.
***Pseudomonas syringae* van Hall on apple and pear in New York State.**
Plant Dis. Reptr, 1950, **34**: 100-1, bibl. 8.

A bacterial blight (different from " fireblight ") is recorded from New York State. The organism isolated from affected flowers is diagnosed as *Pseudomonas syringae*, and reference is made to a similar disease of pears in other countries.—Cornell Univ., Ithaca, N.Y.

2506. HOWLETT, F. S., AND FOWLER, T. E.
New hope for pears in Ohio.
Ohio Fm Home Res., 1950, **35**: 262: 12, illus., from abstr. in *Rev. appl. Mycol.*, 1950, **29**: 367.

During the past 13 years at the Ohio Agricultural Experiment Station only two pear trees top-worked on Old Home have been lost as a result of fireblight [*Erwinia amylovora*], as against over 100 grown on other stocks or on their own trunks. If Old Home is used, top-working forms a blight-resistant framework greatly reducing, if not preventing, loss of trees from girdling, even though the susceptibility of the variety top-worked is not decreased. All standard pear varieties appear to be compatible with Old Home, which is not completely immune, but may be the means of maintaining pear production in Ohio. Supplementary control measures consist in pruning very lightly, if at all, restricting growth by applying a nitrogen-carrying fertilizer intermittently, growing the trees in sod without mulching, and spraying the trees when in bloom with weak bordeaux mixture; infected parts should be cut away at once and a disinfectant applied to the wound.

2507. SMOLÁK, J.
A contribution to our knowledge of water-core disease of apples.
Bull. int. Acad. Sci. Bohême, 1945, pp. 5, illus. [received 1950].

A cytological investigation into the nature of water-core disease of apples revealed that the nuclei of cells in affected tissue are sometimes irregular and amoeboid in form, that the intercellular spaces are larger than those in healthy tissue, and that they are filled with a zoogloea containing bacteria. This zoogloea does not occur inside the cells, but the content of the intercellular spaces is responsible for the watery appearance of the fruit. The bacterium was isolated, and has been provisionally called *Bacterium mali*. Except in one case, attempts to inoculate healthy apples proved unsuccessful; the author believes, however, that the bacteria are directly responsible for the disease.

Fungi.

(*See also* 2735, 3147.)

2508. JØRSTAD, I.
Parasittsoppene på kultur- og nyttevekster i Norge. I. Sekksporesopper (*Ascomycetes*) og konidiesopper (*Fungi imperfecti*). (Parasitic fungi in culture and on cultivated plants in Norway. I. *Ascomycetes* and *Fungi imperfecti*.)
Meld. Stat. plantepatol. Inst. **1**, 1945, pp. 142, bibl. pp. 14 [received 1950].
A description is given of 327 species, some of them comprising many physiological or morphological races. The arrangement is in the order of families, but there is an alphabetical index to Latin names.

2509. FALCK, R.
Lysenko's theory of the variable gene viewed in relation to the life-sphere system of fungus taxonomy.
Palest. J. Bot. (*R*), 1949, **7**: 126-34, bibl. 3.
The author draws conclusions, based on more than forty years' mycological research, that are " essentially in accord with Mitschurin-Lysenko's theory of the variable gene ".

2510. FALCK, R.
The types of symbiotic linkage and their significance for the formation of highly organized forms, functions and life-spheres in the phylogenetic process of development.
Palest. J. Bot. (*R*), 1949, **7**: 1-16, bibl. 11.
From a discussion of the literature the author summarizes his conclusions as follows: " A distinction is made between the cytosymbiosis constituted by intracellular linkage of two kinds of chromosomes or nuclei and the somato-symbiosis of endosomatic cellular unions within a single individual or of exosomatic relations between separate individuals. The various types of such symbiosis are discussed in detail. Special attention is paid to the relation between the fungi usually termed 'parasitic' and their hosts. It is concluded that this relation, instead of being unilaterally harmful to the host, is likely to be in certain respects mutually beneficial to the two organisms. This argument is supported by facts established in studies on mycorrhizae and in the field of animal pathology (*Bacterium coli*) and by considerations of the effect of fungal invasion on plant species as a whole."

2511. NOVÁK, J. B.
Strupovitost a dírkovitost meruněk. (Scab and shot-hole disease of apricots.)
Ochr. Rost., 1950, **23**: 127-36, bibl. 23.
The author considers *Cladosporium carpophilum*, hitherto not reported in Czechoslovakia, to be the cause of apricot and plum scab. Shot-hole disease of apricots is described and contrasted with that of the cherry. Suggested control methods are strict orchard hygiene, a winter wash of carbolineum and DNC preparations, and pre- and post-flowering sprays with copper or sulphur preparations. Peaches should be sprayed with sulphur only.

2512. TERRIER, C.
Les problèmes que pose la lutte contre le coître. (The problem of controlling *Coniella diplodiella* in vineyards.)
Rev. romande Agric. Vitic., 1949, **5**: 89-91.
The summer of 1949 has shown again to what an extent hail damage to grapes is aggravated by subsequent *Coniella* (*Coniothyrium*) *diplodiella* infection of the berries. Optimum conditions for the spread of the fungus and chemical means of controlling it were studied in the laboratory. Of the fungicides tested only oxyquinoline sulphate appeared promising, as it inhibited spore germination at a low concentration. In field trials, however, this fungicide did not always give uniformly good results. Diagrams show the effect of various fungicides in two locations about a month after hail and subsequent treatment.—Lausanne research station.

2513. PALTI, J.
Methods of assessing the incidence of olive leaf spot. A contribution to the technique of plant disease estimation.
Palest. J. Bot. (*R*), 1949, **7**: 156-66, bibl. 6.
Methods are described for appraising the incidence of olive leaf spot caused by *Cycloconium oleaginum* in which account is taken both of the state of infection of leaves persisting on the tree and of defoliation caused by the disease. Although leaf fall is partly dependent on external conditions such as wind, it is considered indispensable in olive leaf spot studies to include an estimation of infection on the shed leaves, especially where infection of the leaves persisting on the tree is slight.

2514. PALTI, J., MOELLER, S., AND REICHERT, I.
Trials for the control of olive leaf spot.
Palest. J. Bot. (*R*), 1949, **7**: 167-73, bibl. 6, illus.
Olive leaf spot (*Cycloconium oleaginum*) was satisfactorily controlled in 3 trials extending over three years by bordeaux mixture at 1% (0·25% Cu) and by the cuprous oxide spray Perenox at ½% strength (0·17% Cu). Under conditions of severe infection a single application was inadequate. Two applications, in summer and autumn, gave good results. Spring applications in addition to either summer or summer and autumn applications were without effect. Under conditions of moderate infection a single application of sprays in summer largely controlled the disease. [Authors' summary.]

2515. Darpoux, H.
Le chancre du chataignier causé par l'*Endothia parasitica*. (Chestnut canker caused by *Endothia parasitica*.)
Doc. phytosan. Ser. path. Inst. nat. Rech. agron. Paris **7**, 1949, pp. 24, illus.
The fungus and the symptoms of the disease are described. Its occurrence in Italy and Spain are mentioned and the precautions to be taken against its extension into France are discussed.

2516. Baldacci, E., and Borzi, Z.
La " ticchiolatura o brusone " del nespolo del giappone. (Scab on Japanese medlar.) [English summary 8 lines.]
Riv. Ortoflorofrutt. ital., 1949, **33**: 204-6, bibl. 8.
Observations on scab found on the fruit and leaves of loquat grown in Sicily and dried specimens at Pavia indicate that the organism responsible is *Fusicladium erybotriae* and that pear and apple scab are also present.

2517. Panfilova, T. S.
The control of vine anthracnose in central Asia. [Russian.]
Vinodelie i Vinogradarstvo (Wine-making and viticulture), 1950, No. 7, pp. 27-8.
Grape vine anthracnose (*Gloeosporium ampelophagum* = *Elsinoë ampelina*), the infection of shoots, leaves, petioles, tendrils and fruits, and the temperature relations of the fungus are described. Recommendations for control are the removal of infected parts and spraying during the dormant season with 10% iron sulphate in 1% sulphuric acid. The period between successive sprayings depends on the temperature as shown in a table, In central Asia, spraying is done in autumn before the vines are covered for winter.

2518. Patrone, I. M.
Notas fitopatologicas: control de la antracnosis de la vid. **(Phytopathological notes: vine anthracnose.)**
Publ. Direc. Agron. Uruguay **100**, 1950, pp. 6.
Notes on vine anthracnose [*Sphaceloma ampelinum*] and the preparation of fungicides for its control.

2519. Moore, M. H.
Brown rot of apples: fungicide trials, and studies of the relative importance of different wound-agents.
J. hort. Sci., 1950, **25**: 225-34, bibl. 14.
Some of the new organic fungicides were tested against apple brown rot (*Sclerotinia fructigena*) but they proved to be ineffective as protective sprays. Codling moth and apple scab proved to be the chief agents which cause wounds allowing brown rot infection, while apple sawfly and mechanical injuries were of minor importance in this connexion. " It was concluded that avoidable losses from mostly primary rotting, which can largely be prevented by spray treatment designed to eliminate the wound-agents, can amount to two to three times as much again as unavoidable losses, though for reasons given this extreme difference is not likely to arise in good commercial practice."—East Malling Res. Stat., Kent.

2520. Moore, M. H.
This brown rot problem.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 169-73.
An account for fruitgrowers, particularly with reference to *Monilia fructigena* (*Sclerotinia fructigena*) on apples, with the results of recent experiments on control [see abstract 2519 above].

2521. Byrde, R. J. W.
Experiments on the control of brown rot of fruits: progress report 1948-49.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 81-9, bibl. 9.
In laboratory spore germination tests of 7 fungicides, the provisional mean ED-50 values (in $\mu g/cm^2$) against *Sclerotinia fructigena* were found to be as follows: phenyl mercury chloride 0·0074; Phygon " XL " 0·03; 8-hydroxyquinoline sulphate 0·058; copper 8-quinolinolate 0·074; bordeaux mixture (as Cu) 0·21; Experimental Fungicide 341-C 0·33; lime-sulphur 1·05. Brown rot infection of plums of the current season was considerably reduced by a late June spray with each of the following materials in a field trial: phenyl mercury chloride 0·0035%, Phygon " XL " 0·1%, copper 8-quinolinolate 0·1%. Experiments with eradicant fungicides against detached mummified plums infected with *Sclerotinia fructigena* confirmed the effective inhibition of spore formation by phenyl mercury chloride and sodium and calcium arsenite preparations. Sodium dinitro-*ortho*-cresolate and sodium pentachlorphenate also showed some promise as possible winter treatments. [Author's summary.]

2522. Angell, H. R.
Observations on brown rot of stone fruits in four successive seasons in four Canberra suburbs.
J. Aust. Inst. agric. Sci., 1949, **15**: 159-60.
Observations in four successive seasons on apricot, peach and almond trees have shown great contrasts in the incidence of brown rot infection caused by *Sclerotinia fructicola* as between adjoining orchards and between adjoining trees. It is suggested that the incidence of brown rot in Canberra appears to be influenced by the physiological status of the trees, which in turn depends largely on the very variable soil environment found in that area.

2523. Angell, H. R.
Some instances of great variability in incidence of brown rot of stone fruits in Canberra in 1949-50.
J. Aust. Inst. agric. Sci., 1950, **16**: 33-4, bibl. 1.
Further observations to those noted in abstract 2522 above also indicate that susceptibility to brown rot infection in stone fruits is induced by conditions peculiar to the immediate environment of the tree. It does not appear to be inherent, nor is the prevailing weather the main factor. Attempts to " build up " inoculum by leaving mummies for three seasons were unsuccessful in altering the incidence of the disease among neighbouring trees.

2524. Turček, F. J.
Rozširuje, alebo ničí strakapúd moniliozu ? **(Does the woodpecker control or spread monilia ?)** [English summary ¾ p.]
Ochr. Rost., 1950, **23**: 159-65, illus.

A great spotted woodpecker (*Dryobates maior pinetorum* Brehm) was observed during the winter and spring of 1950, in a garden in Banská Stiavnica, Slovakia, eating kernels of diseased (*Monilia cinerea*), mummied plums, obviously gathered from adjacent localities. As the fungus in the mummies remains viable till the spring, it is suggested this bird may be a factor in the dissemination of the disease.

2525. Lewis, F. H.
Some recent work on peach brown rot and bacterial spot.
Proc. 91st annu. Mtg Pa St. hort. Ass., 1950, pp. 80-6.

A review of some of the more recent work. No complete control programme is presented.

2526. Wilson, E. E.
Sodium pentachlorophenate and other materials as eradicative fungicides against *Sclerotinia laxa*.
Phytopathology, 1950, **40**: 567-83, bibl. 10.

A spray preparation consisting of sodium pentachlorophenate (4 lb. per 100 gal.) plus a small amount of wetting agent, applied to dormant almond trees in January, reduced by 37 to 87% the number of conidial tufts (sporodochia) produced by *Sclerotinia laxa* on twigs and adhering blossom parts blighted the previous spring. When this treatment was followed by a protective bordeaux spray at the "popcorn" stage (when the unopened blossoms had emerged from between the winter bud scales) the disease was reduced by 76 to 95%. Improvement in the eradicative action of sodium pentachlorophenate was obtained by adding sodium lauryl sulphate and emulsifiable petroleum oil.

2527. Najjar, H.
The European apple tree canker. [Arabic, English summary ⅓ p.]
Circ. Ext. Serv. Minist. Agric. Damascus **39**, 1949, pp. 8.

The European apple tree canker (*Nectria galligena*) causes serious damage to certain varieties of apple in Syria. The entrance hole of the zeuzera borer is often associated with the disease.

2528. Ramsfjell, T.
Et middel mot frukttrekreft. **(A preparation for the control of fruit tree canker.)**
Norsk Hagetid, 1950, **66**: 71-2, illus.

In tests carried out by the Norwegian Plant Protection Service on different varieties in different parts of the country the Dutch preparation Kankerdood was applied to canker (*Nectria galligena*) wounds of different age and size. It was found that the chemical, which contains organic mercury and copper compounds as well as iron and zinc oxide, not only prevents spore development but apparently kills the fungus. All the treated wounds healed well and all attempts failed to isolate the fungus from the dead tissue or to discover any hyphae in it. Control wounds on the same branches or at least on the same tree showed abundant spore development.

2529. Verderevskij, D. D., and Vojtovič, K. A.
Spraying vineyards according to incubation period. [Russian.]
Vinodelie i Vinogradarstvo (Wine-making and viticulture), 1950, No. 6, pp. 28-32.

Correct timing in spraying vineyards for mildew control is all-important. The ending of the incubation period depends largely on temperatures. Low daily average temperatures have a delaying influence on the development of mildew. Result of work, carried out at the Institute for Plant Protection, in Moldavia, proved that spraying vineyards with bordeaux mixture, on the exact date of the ending of each incubation period in the course of a season, ensures complete safety of yield, even during years especially favourable to this disease. A co-ordinated "signalling" system is advocated for vine-growing areas; with its help all vineyards could be sprayed at the critical moment.

2530. Mellor, F. C.
Crown rot of apple—resistance trials.
Abstr. in *Proc. Canad. phytopath. Soc.*, 1950, **17**: 15, from abstr. in *Rev. appl. Mycol.*, 1950, **29**: 263.

Artificial inoculation of nearly 3,000 apple trees, seedlings, and stocks representing 54 varieties in Vancouver, British Columbia, indicated that there is a wide range in varietal susceptibility to attack by *Phytophthora cactorum*. Winter St. Lawrence was very susceptible, 24 out of 28 trees becoming badly rotted. Antonovka was practically immune; only 2 out of 212 trees were seriously affected.

2531. Příhoda, A.
Sclerophoma mali (Brun.) Sydow, houba na jabloni. **(*Sclerophoma mali* on apple trees.)** [French summary 5 lines.]
Ochr. Rost., 1950, **23**: 11-14, bibl. 10, illus.

Sclerophoma mali was found in February 1949 in Bohemia on prunings of apple trees. The author's reason for noting the occurrence of this fungus is that it was recorded by Lambert (1911) as an occasional parasite on young apple trees in nurseries.

2532. Minz, G.
Peach pocket.
Palest. J. Bot. (*R*), 1949, **7**: 185-6, illus.

Taphrina deformans has been recorded for the first time in Palestine attacking peach fruits of the C. O. Smith variety.

2533. Mygind-Gad, H.
Forsøg med bekaempelse af aebleskurv i 1949. **(Trials on the control of apple scab in 1949.)**
Erhvervsfrugtavl., 1950, **16**: 102-4.

Spraying with Midol-thio-mercury gave excellent control of apple scab, as shown by the tabulated results of trials in 3 orchards. The chemical may be applied at any time without danger of leaf scorch.

Nematodes.

2534. Peters, B. G.
Nematodes as crop parasites.
World Crops, 1950, **2**: 11-15, illus.

A general account is given of damage done by eelworms on a wide range of crops of all types from bulbs to tropical plantation trees. Among about 50 species of nematodes so far known to be parasitic in plants *Heterodera marioni* is the most important, particularly in warmer countries where its host range is immense. Control measures are discussed briefly and include

physical methods, particularly heat, soil fumigation, agronomic and possibly biological methods.

2535. Havis, L., and others.
Susceptibility of some peach rootstocks to root-knot nematodes.
Plant Dis. Reptr, 1950, **34**: 74-7, bibl. 3.
In tests described the S37 rootstock variety showed a high resistance to the two species of nematode, *Meloidogyne incognita* and *M. javanica*. Its resistance to the latter, the nematode which causes serious damage to Yunnan rootstocks, is especially important.

2536. Agati, J. A., and Clara, F. M.
Preliminary tests to determine the efficacy of D-D as a soil fumigant against root-knot nematode.
Philipp. J. Agric., 1949, **14**: 233-41, bibl. 4, illus.
In a preliminary trial soil was inoculated with chopped lettuce roots infected with root knot nematode, *Heterodera marioni*. Two weeks later part was fumigated with dichloropropane-dichloropropylene by means of an injector which is described. In tomatoes planted 1 month later [dates are not clear because of an error in the text] only 3·75% of plants in the fumigated plot developed root knots compared with 71·42% in the untreated plot.

Mite and insect pests.

(*See also* 2739.)

2537. Canada.
Annual Report of the Forest Insect Survey, Forest Insect Investigations, Division of Entomology Science Service, Department of Agriculture, Canada, 1949, pp. 122, illus.
These records of insects infesting forest trees have but little horticultural interest though a few of the species mentioned have been found on fruit trees, viz. the spotless fall webworm, *Hyplantria textor* Harr. on cherry, plum, and juneberry in northern Ontario, and in Manitoba on fruit trees; the prairie willow leaf beetle, *Galerucella decora* (Say) on "fruit trees in farm plantings" in central Saskatchewan; ugly-nest caterpillar, *Archips cerasivorana* (Fitch) on fruit trees in a few scattered localities of Manitoba and Saskatchewan. Several others are recorded as attacking wild plum and cherry. The larvae of the walnut caterpillar *Datana integerrima* (G. & R.) were found on most of the walnut, butternut, and hickory trees in southern Ontario and occasionally there was almost complete defoliation.

2538. Muesebeck, C. F. W.
Common names of insects approved by the American Association of Economic Entomologists.
J. econ. Ent., 1950, **43**: 117-38.
In this latest list published by the U.S. Department of Agriculture, Bureau of Entomology and Plant Quarantine, some recent changes in scientific names have been incorporated, together with a number of new common names and a few changes in previously approved common names.

2539. Massee, A. M.
Notes on some interesting insects observed in 1949.
A.R. East Malling Res. Stat. for 1949, 1950, A33, pp. 126-31, illus.
Special reference is made to the pear sawfly (*Hoplocampa brevis*), a new pest of cultivated pear in Britain; the type of damage is illustrated. Details are given of the predacious species of mites found on fruit trees in England; two of them may be regarded as important predators of the fruit tree red spider mite, and are quite common in many orchards in Kent and Essex.

2540. Knudsen, P.
Forsøg med bekaempelse af skadedyr på aebletraeer. **(Trials on the control of apple pests.)**
Erhvervsfrugtavl., 1950, **16**: 100-2.
The results are recorded of one year's spraying trials with Midol-thio-mercury against two species of tortrix moths, apple sawfly and red spider. Two applications at 1% on 12 May and 5 July reduced the number of red spider eggs and mites on 10 leaves to 0 as against 2,450 and 124 respectively on leaves receiving the standard treatment and as against 4,220 and 239 respectively on 10 untreated leaves. The mercury component was only added to protect the trees against scab.

2541. Cox, J. A.
Control of peach insects.
Proc. 91st annu. Mtg Pa St. hort. Ass., 1950, pp. 72, 74-6.
Both the plum curculio, *Conotrachelus nenuphar*, and the oriental fruit moth, *Grapholitha molesta*, were very effectively controlled in Erie County, Pa, with parathion sprays at the rate of 1 lb. of 25% wettable powder or 1½ lb. of 15% wettable powder to 100 gallons. The applications were made at blossom opening and blossom fall time, with a third application 7 days later. If necessary, for the second brood of oriental fruit moth larvae active in July, 2 sprays of DDT, 2 lb. to 100 gallons, can be applied. Lindane and chlordan sprays also show promise for plum curculio control. To control the peach tree borer, *Sanninoidea exitiosa*, 2 applications of DDT, 6 lb. of 50% wettable powder to 100 gallons, applied as a spray to the trunk, crotches and scaffold limbs of the tree, have given good results. The first application must be made soon after the moth appears, the second 3 weeks later.

2542. Marshall, G. E.
Control of insects in sod culture peach orchards.
J. econ. Ent., 1950, **43**: 164-6.
Observations on work at the Fruit Insect Research Orchard of the Purdue University Agricultural Experiment Station, with special reference to insects which cat-face peaches. The 1949 spray programme for Elberta peaches is given.

2543. Ross, W. A., and Armstrong, T.
Common grape insects in Ontario and their control.
Processed Publ. Ser., Ent., Dep. Agric. Ottawa **26**, 1949, pp. 10, illus.
The insects discussed are grape leafhoppers (*Erythroneura* spp.), rose chafer (*Macrodactylus subspinosus*),

grape flea beetle (*Altica chalybea*), grape berry moth (*Polychrosis viteana*) and grape blossom midge (*Contarinia johnsoni*).

2544. NICKELS, C. B.
Some minor insect pests of pecan in Texas.
J. econ. Ent., 1949, **42**: 994-5.
A list of insects, grouped according to the plant organ they feed on.

2545. DICKER, G. H. L.
The shallot aphid, *Myzus ascalonicus* Doncaster, a pest of cultivated strawberries.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 139-40, bibl. 5, illus.
The life history of the shallot aphid is described with special reference to the cultivated strawberry, with symptoms of attack and control by dusting with nicotine or spraying with 0·005% parathion.

2546. DICKER, G. H. L.
The strawberry aphid, *Pentatrichopus fragaefolii* (Coch.), and its control.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 132-8, bibl. 8.
The life history of the strawberry aphid is described with special reference to the dispersal period in May and June. From laboratory and field trials it is suggested at present that 0·005% parathion be used for its control on fruiting plants when applied pre-blossom, whilst 0·1% *bis*(*bis*-dimethylamino)phosphonous anhydride may be used on runner beds, two applications being made, namely in late May and late June.

2547. BENNETT, S. H.
Experiments with systemic insecticides against the green apple aphis—*Aphis pomi*.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 90-6, bibl. 6.
Of six materials tested by making applications to the soil in which apple seedlings were growing, bis(dimethylamino)phosphonous anhydride, "Pestox 3", bis(β-fluoroethoxy)methane and bis(dimethylamino)fluorophosphine oxide showed persistent systemic toxicity to *Aphis pomi*. All gave 100% kill within 4 days, 42 days after treatment with amounts as low as 50 p.p.m. Soil applications of bis(dimethylamino)fluorophosphine oxide, bis(β-fluoroethoxy)methane and Na_2SeO_4 were phytotoxic to apple seedlings, bis(dimethylamino) fluorophosphine oxide causing complete death of the plant at 500 p.p.m. and producing a marginal scorch at 50 p.p.m. When applied by dipping the leaves in 1% aqueous solutions all the materials gave an almost complete kill of *Aphis pomi* but only bis(dimethylamino) phosphonous anhydride, "Pestox 3", bis(dimethylamino)fluorophosphine oxide and bis(β-fluorethoxy) methane, gave high kills at lower concentrations. After application of aqueous solutions of the materials to the leaves of apple seedlings the greatest persistent systemic toxicity to *Aphis pomi* was shown by bis (dimethylamino)phosphonous anhydride and "Pestox 3". Thirty-four days after application of a 1·0% solution to the leaves, a 100% kill of aphides was obtained in 3 days. Bis(dimethylamino)fluorophosphine oxide at 1·0% showed fairly strong persistence for 12 days, but the other materials tested showed no persistence. [From author's summary.]

2548. MOERICKE, V.
Wo entstehen Gynoparen und Männchen der Pfirsichblattlaus (*Myzodes persicae*) Sulz.) ? **(On what plants do gynoparae and males of the green peach aphid occur ?)**
Nachr Bl. dtsch. PflSch Dienst. Braunschweig, 1950, **2**: 99-102, bibl. 6.
In a survey of the green peach aphid population, carried out near Bonn in October 1949, very few autumn forms were found on plants of the cabbage family, while beets, potatoes and tomatoes—especially the latter—harboured a high percentage of winged males and egg-laying females, which are responsible for the infestation of peaches. Brassicas, on the other hand, seem to play an important part in the infestation of herbaceous winter hosts by virginoparae.

2549. DELANOUE, —.
Que savons-nous du capnode noir et des moyens de le combattre ? **(The black *Capnodis* beetle attacking stone fruits and its control.)**
Rev. agric. Afr. Nord, 1950, **48**: 366-70, bibl. 5.
In a review of some of the literature on this increasingly serious pest of stone fruit trees the author describes its life history, the relative susceptibility of different species and rootstocks to attack, and preventive and control measures, especially the use of methyl bromide and HCH.

2550. ROSELLA, E.
Le capnode sévit. **(Capnodis attacks [on apricot].)**
Progr. agric. vitic., 1950, **133**: 343-5.
Note on the use of DDT, HCH and chlordan for spraying the stems of apricot to destroy the eggs of *Capnodis* [*tenebrionis*].

2551. LOZZIA, G.
Note au sujet du parasitisme de l'amandier amer par *Capnodis tenebrionis* L. dans le Maroc Oriental. **(Note on the susceptibility of bitter almond to attack by *Capnodis tenebrionis* in eastern Morocco.)**
Terre maroc., 1950, **24**: 227-8.
Observations in three orchards on beetle damage and population confirm the fact that the bitter almond as a rootstock is not immune to attack by *Capnodis tenebrionis*, but is less subject to attack than peaches, apricots or plums. The abundant secretion of semi-liquid gum on almond roots may possibly impede the development of the larvae.

2552. RINGS, R. W.
Residual action of organic insecticides against plum curculio.
J. econ. Ent., 1950, **43**: 70-2, bibl. 2.
Cage tests involving a study of the speed of knockdown lethal action, and residual toxicity of 13 organic insecticides to plum curculio were conducted in Ohio. Phosphorus insecticides—parathion, ethyl *o*-nitrophenyl thionobenzenephosphonate and ethyl *p*-nitrophenyl thionobenzenephosphonate—were shown to be much more rapid in lethal action, speed of knockdown, and exhibited better residual toxicity to plum curculio

than did any of the chlorinated hydrocarbon insecticides at the dosages used. [From author's summary.]

2553. Chandler, S. C.
A comparative study of insecticides for control of plum curculio.
J. econ. Ent., 1950, **43**: 73-5.
Five sprays and 3 dust treatments were compared in large-scale orchard tests in Illinois, using 5 methods for determining degree of control of the plum curculio, *Conotrachelus nenuphar* on peach. Final order of efficiency is given, the first 3 being: parathion spray at 2 lb. 15% dosage, aldrin spray at 4 and 8 ounces and dieldrin spray at 4 ounces (all per 100 gallons water).—[From author's summary.]

2554. Bobb, M. L.
Insecticides for control of plum curculio.
J. econ. Ent., 1950, **43**: 157-60, bibl. 8.
In experiments conducted by the Virginia Agricultural Experiment Station on plum curculio, *Conotrachelus nenuphar*, control on peaches, benzene hexachloride gave the highest percentage kill of larvae. The beetles, however, were only repelled and later returned to cause much late first brood injury. Parathion gave a good all-round control; aldrin behaved erratically; both chlordan and methoxychlor were unsatisfactory.

2555. Fleming, W. E.
Persistence of effect of DDT on Japanese beetle larvae in New Jersey soils.
J. econ. Ent., 1950, **43**: 87-9, bibl. 1.
DDT treatment of the soil in the spring, at the rate of 25 lb. per acre, to different types of soil in the laboratory and in the field caused substantial reduction in the larval population of the Japanese beetle, *Popillia japonica*, and practically eliminated subsequent broods by mid-September. In the field no significant change in the effectiveness of the treatment was noted in 5 years, but in the laboratory there was a marked decrease in the velocity of insecticidal action in some of the soils during the fifth year. This speed was not affected by the origin of soil but by type, being 50% faster in sands than in loamy soils.

2556. Fleming, W. E., and Maines, W. W.
Effectiveness of methoxychlor against the Japanese beetle.
Publ. U.S. Dep. Agric., agric. Res. Administ., Bur. Ent. Plant Quar. **E-797**, 1950, pp. 4.
In limited tests methoxychlor was as effective as DDT in protecting peach fruit and foliage from the adult Japanese beetle (*Popillia japonica*), but slightly less effective than DDT on apples. It is only one-tenth as toxic as DDT to the beetle grubs in the soil, and so would not be a suitable substitute for it in infested nursery and garden soils.

2557. Wood, S. L., and Knowlton, G. F.
***Diachus auratus*, a new strawberry pest in Utah.**
J. econ. Ent., 1949, **42**: 989.
During picking time, on a 5-acre strawberry field, numerous willow flea beetles, *Diachus auratus*, were found feeding on the aerial parts of the plants, especially on green and partly ripe fruit, causing very heavy damage. After harvest they retired to neighbouring wild rose bushes and willows. No beetles were found more than 30 feet from the strawberries.

2558. Smith, L. M., and Lange, W. H., Jr.
Larvae of *Hoplia oregona* on strawberries.
J. econ. Ent., 1950, **43**: 107.
Larvae of *Hoplia oregona* were causing damage to roots of strawberries in a field near Modesto, California. Control of the larvae was attempted by injecting commercial ethylene dibromide, 10% by volume in naphtha thinner, into the soil at the rate of 2 c.c. per hole, holes 12 inches apart, staggered in 2 rows, one along each side of the raised strawberry bed. After 7 days no larvae could be found, and 16 days after treatment no visible symptoms appeared on the plants as a result of chemical injury.

2559. Moore, M. H.
Nut rotting in *Corylus avellana* L. in relation to the activities of the nut weevil, *Balaninus nucum* L.
J. hort. Sci., 1950, **25**: 213-24, bibl. 16, illus.
A rot and premature nut drop of cobnuts and filberts [*H.A.*, 14: 584, 1607] is shown to be chiefly due to wound parasitism by *Sclerotinia* (*Monilia*) *fructigena* through oviposition punctures by the nut weevil in the soft-shelled nuts early in July. The use of lead arsenate sprays, by controlling the weevil, resulted in some reduction of rotting, but protective fungicides effected no control of the nut drop.—East Malling Res. Stat., Kent.

2560. Fiori, G.
La scolytus rugulosus Müll. e la moria dei ciliegi. (***Scolytus rugulosus* and cherry decline.**)
Riv. Fruttic., 1950, **12**: 21-8, bibl. 7, illus.
In an earlier article Ghillini had attributed the so-called moria decline of cherries to the attacks of a scolytid beetle, *Scolytus mali* [*H.A.*, 18: 2588]. The present author points out that in the provinces of Modena and Bologna *S. rugulosus* is the cause both in adult and larval form. The damage is described and possible control methods are discussed.

2561. Mutz, H.
Der Dickmaulrüssler *Otiorrhynchus ovatus* L. als Schädling der Erdbeeren (*Fragaria*). (**Strawberry root weevil *Otiorrhynchus ovatus* L. as pest of strawberries.**)
NachrBl. dtsch. PflSchDienst Berlin, 1950, **4**: 23-6, bibl. 20, illus.
Heavy infestation by the strawberry root weevil was observed in a 3-year-old strawberry field in 1946 and in a nearby field in 1949 at Strehla (Elbe) in Saxony. *Otiorrhynchus ovatus* L., a serious pest of strawberries in North America, is known in Germany almost exclusively as a forest pest, and further observations will be necessary to ascertain whether it will become an established strawberry pest, or whether the mass appearance of 1946 and 1949 was fortuitous. In case of heavy infestation, mechanical destruction of larvae and pupas through deep ploughing is advised. The effectiveness of DDT and non-smelling hexa-preparations has yet to be proved in field tests.

2562. Connell, W. A.
DDT and methoxychlor for control of strawberry weevil.
J. econ. Ent., 1950, **43**: 222-3, bibl. 5.
In control tests on strawberry weevil, *Anthonomus signatus*, the mean percentage of buds cut by the weevils on plots treated with DDT and methoxychlor was 3·4 and 3·6 respectively, while about three times as many (10·9%) were cut on the plots treated with lead arsenate. Residue analyses indicate that very little insecticide remained on fruits 19 days after application. —University of Delaware.

2563. Hill, A. R.
D.D.T. as a control for vine-weevil.
Gdnrs' Chron., 1950, **127**: 198-9.
The vine-weevil (*Otiorrhynchus sulcatus*) is a nocturnal insect, damaging leaves, petioles and trusses of the vine in the night, and hiding in the soil during the day. In April 1949 in a severely infested glasshouse of the University College, Dundee, a 0·5% solution of DDT was applied between 7.30 and 8 p.m. to the soil and bases of vines. Twelve gallons of insecticide were used covering approximately 550 square feet, which not only soaked the soil but created a barrier zone of active insecticide over which the insects had to pass while ascending to feed. Only a very negligible amount of weevil damage was observed for the rest of the season, and none in 1950.

2564. Lobko, N. K.
DDT for weevil control. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 5, pp. 29-30.
Good control of weevils was obtained in a large orchard of apples, pears and plums in Russia with 5% DDT dust at 20 kg. per hectare. The dusting was carried out from a low-flying aeroplane very early in the morning; beehives in the orchard were covered up for 24 hours. As an alternative protection for bees the removal of the hives to a distance of not less than 5 km. is suggested and no dusting should be done when the temperature is below 16° C.

2565. Dicker, G. H. L.
A note on the effect of DDT in tar oil against the apple capsid, *Plesiocoris rugicollis* Fall.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 141-2, bibl. 3.
Attack was reduced on apples by spraying in March with 0·05 and 0·1% DDT dissolved in tar oil. Later there was a serious attack of fruit tree red spider on those trees.

2566. Michon, R.
Observations sur l'extension et la prolifération de *Ceratitis capitata* (Wied) dans la région parisienne en 1949. (**Observations on the distribution and spread of the Mediterranean fruit fly around Paris in 1949.**)
C.R. Acad. Agric. Fr., 1950, **36**: 229-31.
Severe infestation by the Mediterranean fruit fly around Paris in 1949 is described; it appeared in regions where it had not previously been reported. It was found on mid-season and late varieties of peach, apple and pear. Varieties of pear showing slight, moderate and severe attacks are listed.

2567. Miner, F. D.
Injury to raspberry by a meadow grasshopper.
J. Kans. ent. Soc., 1947, **20**: 86-7, from abstr. in *Rev. appl. Ent. Ser. A*, 1950, **38**, p. 161.
Damage to raspberry canes as a result of oviposition by *Orchelimum vulgare*, Harr. occurred in Arkansas in the autumn of 1945. Similar injury, but not of economic importance, was seen on maize, Johnson grass (*Sorghum halepense*), rose and chrysanthemum.

2568. Tunblad, B.
Något om sommarens erfarenheter av tiofosforpreparaten. (**Some observations on thiophosphate preparations made in summer 1949.**)
Växtskyddsnotiser, 1949, No. 4, pp. 1-5.
Various thiophosphate preparations on the Swedish market are being tested by growers and research workers. In experiments carried out by the Swedish plant protection station in two orchards near Stockholm satisfactory results (tabulated) were obtained against fairly heavy infestations of apple leaf hopper.

2569. Andison, H.
The bramble leafhopper.
Processed Publ. Ser., Ent., Dep. Agric. Ottawa **116**, 1950, pp. 4.
In the coastal plains of British Columbia the bramble leafhopper, *Typhlocyba tenerrima*, a major pest of cane fruits, is easily controlled by two applications of DDT.

2570. Dean, R. W.
Summer control of orchard mites in eastern New York.
J. econ. Ent., 1950, **43**: 167-71, bibl. 2.
Tests of a number of acaricides against a declining infestation of European red mite [*Paratetranychus pilosus*] resulted in good control with all. When paired applications of tetraethyl pyrophosphate were made at intervals of from 7 to 14 days, control decreased as the interval between sprays increased. In one test of di-*p*-chlorophenylmethylcarbinol against the two-spotted spider mite, *Tetranychus bimaculatus*, outstanding control resulted from two applications, 10 days apart, of a 25% emulsion at the rate of 1 pint per 100 gallons. Against a mixed population of European red and two-spotted spider mites, di-*p*-chlorophenylmethylcarbinol, *p*-chlorophenyl *p*-chlorobenzenesulphonate, an aryl alkyl sulphite, a dimethyl dithiophosphate compound and tetraethyl pyrophosphate, in from two to four applications, gave satisfactory control for a period of 3 months, although low mite populations persisted in the trees. [Author's summary.]

2571. Asquith, D.
Dormant and delayed dormant sprays to control European red mite on apple.
J. econ. Ent., 1950, **43**: 220-1, bibl. 5
and
Red mite control.
Proc. 91st annu. Mtg Pa St. hort. Ass., 1950, pp. 78-9.
A combination spray to control European red mites, aphids and scab is as follows: Strictly dormant, 1 lb.

40% DN powder or 1 qt. liquid DN, 1 gallon miscible superior oil to 100 gal. water. Delayed dormant, 2 lb. copper sulphate, 2 lb. fresh spray lime, 1 gallon miscible superior oil to 100 gal. water. If two-spotted or Schoenei mites enter the trees after an infestation of European red mites has been cleaned up, another series of sprays will be necessary: 15% parathion at ½ lb. in 100 gal.—2 applications 5 days apart or at ¾ lb. in 100 gal.—2 applications 7-9 days apart; or TEPP ½ to ¾ pint in 100 gal.—2 applications 5 days apart.—The South Mountain Fruit Research Laboratory, Arendtsville, Pa.

2572. HEMBITZER, E.
Bekämpfung der Spinnmilbe durch Vergasen. **(Control of red spider [on strawberries] by fumigation.)**
Gartenwelt, 6 May, 1950, No. 9, from abstr. in *Rev. Agric. Brux.*, 1950, **3**: 758.

A gas chamber used in Switzerland for the methyl bromide fumigation of young strawberry plants is described. It will hold about 4,000 plants and the temperature in the chamber can be electrically controlled at 18-20° C. during the fumigation. Plants should be treated for 4 hours and then planted out immediately. Treated plants are not only free from red spider but are immune from attack.

2573. LATHROP, F. H., AND HILBORN, M. T.
European red mite control.
J. econ. Ent., 1950, **43**: 172-5, bibl. 4.

Applications of sulphur to control apple scab seemed to have increased the European red mite [*Paratetranychus pilosus*] population in Maine. A programme of frequent post-blossom applications of an insecticide-fungicide combination designed to prevent the development of injurious populations of red mite and also give effective control of apple scab, is necessary. Good results achieved with dinitro capryl phenyl crotonate dusts containing 5% active ingredient are discussed, and the promising effect of glyoxalidine is mentioned.

2574. BOUGARD, M.
L'araignée rouge. **(The red spider.)**
Courr. hort., 1950, **12**: 342-3.

Lists are given of apple and plum varieties most susceptible to attack by the fruit tree red spider, *Paratetranychus pilosus* [*Oligonychus ulmi*], followed by notes on its habits, life cycle, natural enemies, and its control with E605, TEPP, and derris preparations.

2575. JANCKE, O.
"Rote Spinne" an Reben und E 605. **(Red spider on vines and E605.)**
Höfchen Briefe, 1950, **3**: 3: 8-11, bibl. 2, illus.

A single treatment with 0·03% E605 gave effective control of the mites *Epitetranychus althaeae* and *Paratetranychus pilosus* in a young vineyard.—Neustadt/Haardt, Germany.

2576. VICINI, L.
Gravi infestazioni acaridiche delle piante agrarie. **(Serious mite infestations of crop plants.)**
Ital. agric., 1950, **87**: 230-4, bibl. 10, illus.

Three mites infesting crop plants in Italy are described. *Tetranychus pilosus* is found mostly on fruit trees. *T. telarius* is less frequent than *T. pilosus* on stone and pome fruits, but is found on citrus, ornamental and garden plants. *Penthaleus haematopus* mostly infests vegetables. Reference is made to the damage caused. In trials mentioned, sulphur preparations were found to be ineffective for control, and of the various insecticides only certain phosphorus compounds gave satisfactory results.

2577. BLAIR, C. A.
Observations on the life history of the fruit tree red spider mite *Metatetranychus ulmi* (Koch).
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 143-5, bibl. 6.

A progress report on the life history of the fruit tree red spider mite and of the kind of damage it causes to the foliage of apple trees.

2578. BORGMAN, H. H.
De "Rode vrucht ziekte" bij bramen, veroorzaakt door de galmijt *Eriophyes essigi* Hassan. **(The redberry disease of blackberries caused by the gall mite *Eriophyes essigi* Hassan.)** [English summary ¼ p.]
Tijdschr. PlZiekt., 1950, **56**: 149-60, bibl. 7, illus.

For some years this mite has caused damage to blackberries in the Bommelerwaard (Holland). The infestation developed in a few years from a harmless to a serious one. Control measures based on American and English recommendations were ineffective in Holland. Experiments showed that wettable sulphur, lime-sulphur and mineral oil gave good results, while hexaethyl-tetraphosphate (HETP), parathion, and azobenzene (spray) were useless.

2579. MANZEL, R.
Zum Auftreten von Zikaden und Milben an Reben. **(The infestation of vines with cicadas and mites.)**
Schweiz. Z. Obst- u. Weinb., 1950, **59**: 248-9.

Hot weather in June favoured the infestation of vines with cicadas (mostly *Chlorita flavescens*) and mites (*Eriophyes vitis*) in Switzerland. The former can be easily controlled by adding a synthetic insecticide to the copper spray, while the latter requires preventive treatment. An addition of 0·5% lime-sulphur to the bordeaux mixture will check the anticipated spread of red spider.

2580. HOLZ, W.
Missgestaltete Birnenfrüchte. **(Deformed pears.)**
NachrBl. dtsch. PflSchDienst. Braunschweig, 1950, **2**: 93-4, bibl. 1, illus.

Marked deformations of Comtesse de Paris pears were observed in private gardens in Oldenburg, Germany. The suggestion that the mite *Oribata* sp. may be responsible is not wholly accepted by the author.

2581. ARMSTRONG, T.
Control of borers attacking peach trees.
Processed Publ. Ser., Ent., Dep. Agric. Ottawa **112**, 1949, pp. 8, illus.

(1) Peach tree borer; control by soil application of

ethylene dichloride emulsions in October to early November or of paradichlorobenzene crystals in the first half of September, (2) lesser peach tree borer and (3) shot-hole borer to be controlled by pruning and sanitary measures. A key and a photograph of the injury caused help to identify the 3 species.

2582. PUTMAN, W. L.
Laboratory technique for testing codling moth insecticides.
Canad. Ent., 1949, **81**: 4: 85-93, bibl. 1, from abstr. in *Rev. appl. Ent. Ser. A*, 1950, **38A**, pp. 182-3.

The spraying equipment comprised a device for rotating single apples in spray discharged from a nozzle; separate mountings allowed adjustment of the height of the apple or nozzle and the distance between them.

2583. HUSZ, B.
Beszámoló az 1948, évi almafapermetezési kisérletekröl. **(Report on apple spraying experiments in 1948.)** [English abbreviated text 1½ p.]
Bull. Fac. Hort. Buda., 1949, **13**: 234-41.

The old summer spray schedule of bordeaux mixture and calcium arsenate combination used hitherto in Hungary for codling moth control, is to be replaced. Lead arsenate, particularly when followed by a nicotine-mineral oil emulsion, was found most effective of the spray materials tested.

2584. ROEHRICH, R. (M. ET MME.).
Recherches sur le carpocapse (*Laspeyresia pomonella* L.) et sur la tordeuse orientale du pêcher (*L. molesta* Busk.) en Chalosse, en 1949. **(Experiments with codling moth and the oriental peach moth in Chalosse, [Landes] in 1949.)**
C.R. Acad. Agric. Fr., 1950, **36**: 174-7.

In trials for the control of codling moth and the oriental peach moth the authors found that lead arsenate is excellent against codling moth, but not efficient against the peach moth. SNP is active against the various stages of the peach moth and the larvae and eggs of codling moth, but appears not to have duration of action sufficient to warrant its use against codling moth. DDT, however, has reduced the damage caused by both these insects by about 75%.

2585. TASCHENBERG, E. F.
An appraisal of some chlorinated hydrocarbon and organic phosphate insecticides for grape berry moth control.
J. econ. Ent., 1950, **43**: 76-81, bibl. 4.

In field studies conducted at the New York State Agricultural Experiment Station, on the control of grape berry moth, *Polychrosis viteana*, DDT was found the most effective of the chlorinated hydrocarbons, with methoxychlor second. Parathion was slightly superior to DDT, while the other organic phosphates were ineffective. The efficiency of parathion was not decreased by bordeaux mixture. The residue from 1 parathion spray at 1-100 rate was less than 1 p.p.m. 7 days after treatment and less than 0·1 p.p.m. at the end of 3 weeks.

2586. TASCHENBERG, E. F., AVENS, A. W., AND COX, J. A.
Supplements in DDT sprays for control of grape berry moth.
J. econ. Ent., 1950, **43**: 152-7, bibl. 12, illus.

While DDT spray programmes containing a miscible oil (9 parts oil and 1 part emulsifier) gave the highest degree of control of grape berry moth, *Polychrosis viteana*, they also gave the highest DDT residues on the harvested fruit. DDT sprays containing no supplement gave the lightest residues at harvest, but such schedules did not give a high degree of control. Actions of a number of commercial compounds are evaluated.—New York and Pennsylvania. [See also *H.A.*, 19: 2947.]

2587. MAXWELL, C. W. B.
Field observations on the black army cutworm, *Actebia fennica* (Tausch.), and its control on blueberries in New Brunswick.
Sci. Agric., 1950, **30**: 132-5, bibl. 1.

Brief life history, nature of injury, characteristics of the outbreak and estimation of infestation are described. Three per cent. DDT dust, at the rate of 4 lb. per acre, gave almost 100% mortality of the insect.

2588. BERRY, R. C.
Ryania for control of cranberry fruitworm.
J. econ. Ent., 1950, **43**: 12.

On the basis of 1 year's experiments, carried out throughout the cranberry-growing areas of Massachusetts, Ryania [Ryanicide a trade name for sprays and dusts made from *Ryania speciosa*] is as effective for the control of the cranberry fruit worm, *Mineola vaccinii*, as either rotenone or cryolite.

2589. JOHANSEN, C., AND BREAKEY, E. P.
Control of the orange tortrix on red raspberries.
J. econ. Ent., 1949, **42**: 911-14.

Tests and observations on orange tortrix, *Argyrotaenia citrana* Fern., were continued in 1948 [see *H.A.*, 19: 2007] at the Washington Agricultural Experiment Station. Of the 11 insecticides tested dichlorodiphenyl dichloroethane gave the most consistently good results and the best residual action. A number of parasites partially responsible for orange tortrix control are mentioned and alternate host plants are listed.

2590. NOVOPOLSKAJA, E. V.
The rosana tortrix moth in the Crimea. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 4, pp. 34-5, illus.

The rosana tortrix moth [? *Cacoecia rosana*] is a serious pest of fruit trees in the Crimea, infesting flowers, leaves and the young fruit, particularly those of pear, but also occurring on apple and sweet cherry, rarely on plum. Its life cycle is described. Spraying from the air with solar oil three weeks before the larvae appeared killed 90·9% of the eggs. Spraying twice in May with Paris green or calcium arsenate killed an insignificant number of larvae (1-2%).

2591. MADSEN, H. F., AND BORDEN, A. D.
The eye-spotted bud moth on prune in California.
J. econ. Ent., 1949, **42**: 915-20, bibl. 10, illus.

The eye-spotted bud moth, *Spilonota ocellana*, attacks

plum, apple, cherry, peach, pear and apricot, but at present causes the heaviest damage on prunes. The first damage in the spring through destruction of buds is of little economic importance, but the summer generation of larvae causes considerable damage by attacking fruit. Early in the season the larvae are leaf feeders, but later they tie the leaf to the fruit and feed on it, producing small shallow holes and gumming, which in turn sticks the now dry leaf to the prune. During processing this leaf tissue is not removed and the dried fruit is graded as cull. Losses up to 40-50% can thus be sustained. The life history of the insect is described; parasitism is very low. Three years' control experiments showed that 1 lb. of 15% wettable, or 12 oz. of 25% wettable parathion, and dichlorodiphenyl dichloroethane, at the rate of 2 lb. per 100 gallons, gave excellent control. The best time to spray is during the summer months, when 70% of the eggs have hatched. [From authors' summary.]

2592. FRANKLIN, H. J.
A new cutworm on cranberry.
J. econ. Ent., 1949, **42**: 986, illus.
A sixth species of cutworm, *Hyppa xylinoides*, identified on cranberry bogs in Massachusetts is described.

2593. DOUTT, R. L., AND HAGEN, K. S.
Biological control measures applied against *Pseudococcus maritimus* on pears.
J. econ. Ent., 1950, **43**: 94-6, bibl. 3.
The dominant natural enemy of the mealybug, *Pseudococcus maritimus*, occurring on pears in the Santa Clara Valley of California is the green lacewing, *Chrysopa californica*. Eggs of *Chrysopa* artificially supplied to sprayed orchards in small colonizations of 250 eggs per tree made at the proper time and repeated in 2 successive periods gave most effective control. Such repeated colonizations were better than a larger single colonization. [From authors' summary.]

2594. BÖRNER, C.
Die erblichen Grundlagen von Befall und Nichtbefall der Pflanzen durch tierische Parasiten. **(The genetical basis of susceptibility and resistance to pests in plants.)**
NachrBl. dtsch. PflSchDienst Berlin, 1949, **3**: 121-30, bibl. 23.
Phylloxera resistance in vines, the author's own field of research, is used as the basis for a general discussion on the complex problem of plant resistance to pests. Vines are resistant if the biotype of phylloxera attacking the plant encounters the specific necrotic toxin to which it is susceptible. On the other hand galls develop in cases where either the host does not form any necrotic toxins on infestation or the genetical constitution of the phylloxera does not contain the lethal factor on which the toxins formed may act. It is believed that resistance and immunity to pests in other cultivated plants are governed by similar mechanisms.

2595. MÜLLER, F. P.
Versuche über die Wirksamkeit von Hexa- und Estermitteln gegen wurzelbesaugende Insekten. **(Experiments on the action of BHC and ester preparations on root-sucking insects.)**
NachrBl. dtsch. PflSchDienst Berlin, 1949, **3**: 161-8, bibl. 12.
This investigation was carried out at the Naumburg branch of the Biol. Zentralanstalt to test the feasibility of controlling woolly aphid and phylloxera infesting the roots of fruit trees and vines respectively by synthetic contact insecticides. The action through a layer of soil of several BHC and ester (parathion basis) preparations was tested in the laboratory against colonies of woolly aphid on apple twigs. With the exception of one BHC emulsion, where the action was found to be due to the solvent, the gaseous phase was so insignificant as not to injure the pests. A woolly aphid colony remained unharmed if separated, for instance, by a 1 cm.-layer of soil from the insecticide. The inactivation of BHC is due probably, not to chemical changes, but to soil adsorption which does not affect contact toxicity.

2596. NAJJAR, H.
The phylloxera. [Arabic, English summary ½ p.]
Circ. Ext. Serv. Minist. Agric. Damascus **46**, 1950, pp. 12.
Phylloxera has infested vineyards in two localities in Syria and caused the usual damage. Growers are warned against the introduction to free areas of American vines, which, though resistant, may act as carriers.

2597. DAVIES, R. G., AND EATON, J. K.
Field experiments on the control of apple sawfly, *Hoplocampa testudinea* (Klug), by some synthetic insecticides.
A.R. East Malling Res. Stat. for 1949, 1950, A33, pp. 146-50, bibl. 5.
γ-Benzene hexachloride, diethyl *p*-nitrophenyl thionphosphate (E605, parathion) and the chlorinated hydrocarbon, chlordan, were all shown to give control of apple sawfly equal to, or better than, that of a petal-fall spray of nicotine.

2598. ROBERTI, D.
Le oplocampe delle susine. **(Plum sawflies.)**
Ital. agric., 1950, **87**: 189-93, illus.
Three species of *Hoplocampa* infest the plum in Italy, viz. *H. flava* L., *H. minuta* Christ, and *H. rutilicornis* Klug, the last being the most common and destructive in south Italy. Their life cycle and the damage caused by them are described. Good control was obtained by one post-blossom (when about 75% of the petals had fallen) application of DDT emulsion, wettable DDT and hexachlorocyclohexane, the infested fruits being 0·3, 8·0 and 10·0% respectively, while the control trees showed 91 to 98% infestation.

2599. KJELLANDER, E.
Ett bekämpningsförsök mot plommonstekel. **(A trial on the control of plum sawfly.)**
Fruktodlaren, 1950, pp. 46-8.
In 1948 at Sånga-Säly, Sweden, Rotoxol E gave better control of plum sawfly on Victoria than Gesarol plus spreader. The real issue of this trial, however, was to compare the value of emulsions as against that of suspensions. It is concluded that the former are preferable, if spraying has been left too late and the larvae have begun to hatch at the time of the application. Although there is no experimental evidence for this, it seems likely that a suspension with its greater

residual action should give better protection if the spray is applied early.

2600. Rivnay, E., and Bitinsky-Salz, H.
The oriental hornet (*Vespa orientalis* L.); its biology in Israel. [Hebrew, with English summary ⅔ p.]
Bull. agric. Res. Stat. Rehovot **52**, 1949, pp. 32.

Biblical and Talmudic references to the oriental wasp are reviewed. In Israel it not only harms man and domestic animals but also attacks twigs and fruit of ornamental and fruit trees and kills bees to such an extent that often entire apiaries are destroyed. Its preference for certain foods has been studied in relation to their use as baits. Control measures include the destruction of queens in the spring and the nests in summer. When the nests cannot be reached, traps are suggested. In addition to a bait of meat, talc and an insecticide are recommended. Thallium sulphate, lead arsenate and BHC gave satisfactory control.

2601. Borzini, G., and Picco, D.
Experienze di lotta contro l'aspidioto e la cocciniglia grigia del pero, effettuate nel 1949. **(Trials for the control of San José scale and the grey pear scale in 1949.)**
Not. Mal. Piante, 1950, No. 10, pp. 33-8.

In trials for the control of San José scale (*Aspidiotus perniciosus*) and the grey pear scale (*Diaspis leperii*) a mineral oil-polysulphide mixture and dinitrocresol gave good results. The dinitrocresol appeared to be the better against the grey scale, the white oils against the San José scale.

2602. Pitcher, R. S.
Slug damage to raspberry canes.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, p. 131, illus.

Although itself of little importance, slug damage has an indirect significance in that it throws the cane open to invasion by other organisms, notably the raspberry cane midge (*Thomasiniana theobaldi*) whose larvae also feed on the superficial tissues of these canes.

Other pests.

(*See also* 3333.)

2603. Fitzwater, W. D., Jr.
The orchardist and wildlife.
Proc. 95th annu. Mtg N.Y. St. hort. Soc., 1950, pp. 186-91.

The author, a member of the U.S. Fish and Wildlife Service, Ohio State University, Columbus, deals in turn with particular animal pests. *Field mice.* Where activity is noticeable a teaspoonful of strychnine-treated oats in *all* the *active* runs round the bases of trees where they are starting to work at about the end of January [in N. York State] is recommended. *Deer.* Chemical repellants of which good reports have come in are Good-rite Z.I.P. (Goodrich Chemical Co., Cleveland 15, Ohio) and Diamond "L" Brand Deer Repellant (Harry N. Leckenby Co., 1634 Fifteenth Ave. West, Seattle 99, Wash.). One spray treatment is said to last the dormant season. Scare devices are no use. Close staking or wiring are the only other—very laborious—methods of prevention. *Rabbits.* Shooting, trapping or the use of Rabbit Repellant 96A (U.S. Fish and Wildlife Service) are recommended. Shooting or trapping will also generally dispose of squirrels and woodchuck, or the woodchuck can be gassed.

2604. Korten, —.
Die Wühlmausbekämpfung in der Baumschule. **(Vole control in the nursery.)**
Dtsch. Baumsch., 1950, **2**: 183-5, illus.

A new preparation consisting of root shreds treated with zinc phosphide recently marketed as Wühlmaustod Arvikol is recommended by the Biologische Bundesanstalt, Braunschweig, for use against voles in the form of poison bait.

2605. Mansfeld, K.
Prüfung von Scheuchmitteln, insbesondere Habichtattrappen, zur Abwehr von Vogelschaden. **(Tests with bird scarers, in particular with imitation hawks.)**
NachrBl. dtsch. PflSchDienst Berlin, 1949, **3**: 205-10, bibl. 6.

In trials extending over several years imitation flying hawks were found to give good protection to cherries and small fruit against rooks, magpies and swarms of blackbirds, while noisy and shiny wind-propelled devices gave better results against small birds. It is advisable to change the type of scarer occasionally and to remove it after harvest. Illustrated directions are given for the manufacture of imitation hawks from tin-foil.—Bird protection station of the Biol. Zentralanstalt, Seebach, Kr. Langensalza.

2606. Reich, H.
Neue Versuche zur Starenbekämpfung bei Süsskirschen. **(New attempts to control starlings in cherry orchards.)**
Mitt. ObstbVersuchsring Jork, 1950, No. 15/16, pp. 84-7, illus.

Experiences gained in Altenland indicate that noise, whistling, shooting, rattles, etc., relaid on loudspeakers, can deter flights of starlings from cherry plantations. A combined operation, covering a wide area, is much more effective than safeguarding individual orchards; no automatic controls are practicable, the switching on of strategically placed loudspeakers has to be done by a man from an observation tower; and the operation to be really successful must start early in the season.

2607. Vicini, L.
Nuova azione parassitaria sui fiori della drupacee. **(A new danger for drupe fruits.)**
Riv. Ortoflorofrutt. ital., 1950, **34**: 101-4.

An account of the destruction of the flowers of peach and cherry near Verona by sparrows, which made their raids at all hours of the day with a preference for the evening and the morning. The ultimate damage was not serious since in most cases the ovaries and styles remained unhurt. Two suggestions are put forward to explain the phenomenon. The first is that as a result of a mild winter an abnormally large number of birds survived and were then faced by a diminished food supply resulting from the use of the new insecticides. It is suggested from Switzerland, on the other hand, that there the blackbirds and sparrows get so much farinaceous matter, grain and macaroni remains etc. as food in the winter that they attack the flowers to get the necessary vitamins.

2608. Ministry of Agriculture, London.
The wood-pigeon.
Adv. Leafl. N.A.A.S. Lond. **165**, 1950, pp. 4, illus., 1d.
The breeding and feeding habits and the damage caused to field and horticultural crops by the wood-pigeon are outlined, and methods of control by shooting from " hides " and by " decoys " are described.

Parasitic plants.

2609. Tihovidova, V. K.
Controlling dodder in vineyards. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 4, pp. 45-6.
Dodder (*Cuscuta* sp.) is described with particular reference to its parasitization of the grapevine in Russian vineyards. It is reproduced not only by seed but also by pieces of stem and so can be disseminated by the water of the irrigation channels. A recommendation for its control is the application of sulphur dust, 150-200 g. per sq. metre, to the soil in spring, when the dodder seeds are germinating.

Antibiotics.

(*See also* 3438.)

2610. Thaysen, A. C.
Antibiotics in the soil.
Nature, 1950, **166**: 93-4, bibl. 14.
Among observations arising from the work carried out at the Colonial Microbiological Research Institute, Trinidad, the author reports that " the antibiotic-producing microflora, for example, of the rhizosphere, is strongly active against lower fungi, including both plant and animal pathogens. One particular organism, isolated from this habitat, produces an antibiotic, or perhaps several antibiotics, which suppresses not only fungi and yeasts, but also Gram-positive and Gram-negative bacteria with equal facility, while others have a more restricted field of action. There are indications even that some of these antibiotic-producing organisms are specifically adapted to their habitat and depend for their normal development on conditions prevailing there, including, perhaps, secretions from the root system itself. The implications of this, should it be confirmed, might be far-reaching for the control of soil-fungus infections of plants . . ."

2611. Collier, W. A., and van der Pijl, L.
Investigations on the antibiotic activity of the leaves of plants on Java.
Chron. Nat., 1950, **106**: 73-80.
The results are listed of preliminary tests of the antibiotic activity of nearly 300 Indonesian plants representing a cross-section of the plant kingdom, special attention having been given to plants used in native medicine. The families *Myrtaceae*, *Compositae* and *Euphorbiaceae* contained particularly high proportions of active species.—Pasteur Institute and Faculty of Science, University of Indonesia.

2612. Grosjean, J.
Substances with fungicidal activity in the bark of deciduous trees.
Nature, 1950, **165**: 853-4, bibl. 2.
From the bark of several *Populus* spp. a fungicidal substance was isolated which killed cultures of *Stereum purpureum* when added to a nutrient agar in sufficient concentration. A leaf extract of *P. candicans* was also found to possess fungicidal activity, though inferior to that of the bark. This is uncommon, as generally the inhibitor present in the leaf shows the stronger action.—Wageningen.

2613. Petersen, D., and Cation, D.
Exploratory experiments on the use of Acti-dione for the control of peach brown rot and cherry leaf spot.
Plant Dis. Reptr, 1950, **34**: 5-6.
Acti-dione [cycloheximide], an antibiotic produced in cultures of *Streptomyces griseus*, used in spraying trials on peach (for brown rot, *Monilinia fructicola*) and cherry (for leaf spot, *Coccomyces hiemalis*) was found to have fungicidal properties. At 10 p.p.m. it appeared to have exceptional eradicative action on the cherry leaf spot fungus without injury to the foliage.

Sprays and spraying apparatus.

(*See also* 2680.)

2614. Directie van de Landbouw.
Bestrijding van plantenziekten in de landbouw: receptenboek. **(The control of plant diseases in agriculture: book of formulae.)**
Meded. PlZiekt. Dienst **116**, 1950, pp. 92.
This handbook consists of two parts: I. Control measures, II. Control preparations. Part I mentions the chief pests of agricultural crops with general measures for controlling them. The crops are then taken in alphabetical order with further details of control. Part II deals with insecticides, baits, preparations against storage pests, fungicides, seed disinfectants, weedkillers, preparations for deficiency diseases, rodents, bird-scarers, protection against wild animals, wood preservatives, wetting and sticking preparations. It concludes with a list of manufacturers, dealers and importers of the products, and an index of the preparations mentioned.

2615. Karnatz, H.
Erfahrungen mit der Schädlingsbekämpfung in Wildlingskulturen. **(Plant protection of wild seedling rootstock plantations.)**
Mitt. ObstbVersuchsring Jork, 1950, No. 11/12, pp. 66-7.
Scab and mildew are the most frequently occurring fungal diseases of wild seedlings, and aphids are the most widespread pests. The first spray for scab control is a 1% copper preparation with an addition of 0·02% E605. Thereafter, according to the weather, spraying is repeated at fortnightly intervals with an organic preparation, Fuklasin plus lead-arsenate at 1% concentration. Heavily mildewed plants should be removed and burnt and the rest treated with sulphur, repeating the operation as required. Aphids are controlled by 0·2% Nexen sprays. A complete " control calendar " as used at the Fruit Research Station, Jork, Germany, and a list of most susceptible fruit varieties are given.

2616. ANON.
Goedgekeurde bestrijdingsmiddelen. (Approved control preparations.)
Vlugschr. PlZiekt. Dienst Wageningen **65**, 1950, pp. 4.
A list of approved products for disease and pest control with the names of the Dutch firms supplying them.

2617. KEARNS, H. G. H., AND MARSH, R. W.
A summary of fruit spraying programmes: 1949 revision.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 96-103, bibl. 3.
The recommended spray programme for apples, pears, plums, cherries, black currants, red currants, gooseberries, raspberries, loganberries, blackberries and strawberries was last revised in 1941 [*H.A.*, 12: 887]. This is now brought up to date in the light of experience gained in the uses of the older materials and of a number of valuable new plant protectants. Parathion is not included, as sufficient is not yet known of its toxicity to man.

2618. GJOERUM, H. B.
Forsøk med insektmidler i frukthagen. (Spraying trials against fruit pests.)
Norsk Hagetid, 1950, **66**: 14-16.
Tabulated data are presented on spraying trials with DDT, parathion and other insecticides carried out in 1949 against apple blossom weevil, plum sawfly and apple capsid bug.—State Plant Protection Service.

2619. HEY, G. L.
The new sprays need exact timing.
Grower, 1950, **33**: 1167, 1169-71.
Suggestions are made for the use and timing of sprays of DNC, parathion and BHC, etc., with special reference to control of red spider, sawfly and codling moth.

2620. KESSELRING, H.
Stationäre Rebenspritzanlagen. (A stationary spraying plant in the vineyard.)
Schweiz. Z. Obst- u. Weinb., 1950, **59**: 242-6.
It is shown that under Swiss conditions it is profitable to erect a stationary spraying plant in any fair-sized vineyard. Apart from the saving in cost, the considerable saving of labour is an important point, as the spraying against *Peronospora* falls in the busiest period.

2621. YOUNG, H. C.
A progress report on the development of machines for the application of concentrate sprays and the reduced costs resulting from their use.
Proc. 95th annu. Mtg N.Y. St. hort. Soc., 1950, pp. 86-93.
A discussion of the results of work at Geneva, Cornell and Ohio which, it is suggested, have made it possible to apply concentrate sprays with no more damage than has previously been experienced with dilute sprays, and with a considerable reduction in cost. For success the speaker makes six postulates, namely: the concentrate must be delivered into the air stream under high pressure, 400 to 600 lb., (2) the wind velocity at the fan should be about 90 m.p.h. and the fan should develop 20,000 cubic feet of air per minute, (3) the machine must pass close to or partly under the tree being sprayed, (4) the rate of speed of passing a tree must be exactly that to ensure the right amount of spray being delivered, (5) every part of the tree must be covered, and (6) special care in driving is necessary under adverse spraying conditions. The author sums up, with many cautions, strongly in favour of the future of concentrate spraying. This paper was followed by others on particular aspects of concentrate sprays by A. B. Burrell of Cornell, and other authorities (pp. 93-112) with special emphasis on different features of mist sprays, the discussion and present position being summarized by A. B. Burrell. He advises caution and discusses briefly the use of particular materials and apparatus. In a further paper, pp. 113-19, Burrell tells of experiments on the application of " somewhat " concentrated sprays with the speedsprayer.

2622. PRATT, R. M.
Development and use of a concentrate sprayer for orchards.
Proc. 91st annu. Mtg Pa St. hort. Ass., 1950, pp. 63-4, 66-8, 70-1, bibl. 3.
The results of 9 years' research, and commercial experience during 1949, indicate that with the concentrate spray method, using the right equipment, superior insect and disease control can be obtained [see also *H.A.* 19: 1099]. Uniformity and persistence of spray deposit, rapidity, economy of labour, accurate timing and low water consumption are among the advantages claimed.

2623. (RONALDSON, F. H.)
Spraying fruit trees. New method devised for Australian conditions.
Fruit World, Melbourne, 1950, **51**: 6: 21.
American spraying machines are too expensive for Australian conditions, but—as Mr. Ronaldson has shown—complete coverage can also be achieved by simpler means, if the trees are small, a maximum height of 14 feet being common in Australia. The machine described and illustrated delivers $1\frac{3}{4}$ gallons of mixture on each tree in 5 seconds, spraying the tree from the top as well as from the side and from underneath. Its special feature is an overhead boom with 9 jets for spraying downwards, suspended from the stationary boom at the top of the mast. The height of this boom is easily adjustable according to the size of trees. The top, bottom and side spray systems can be turned on independently. Another advantage in the design is that the whole system can be swung from one side of the machine to the other so that spraying can be done always with the wind blowing away from the driver.

2624. KEARNS, H. G. H., AND MORGAN, N. G.
The automatic spraying of top fruit with a spray " mast ".
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 104-10, bibl. 4, illus.
Factors affecting the efficiency of spraying are discussed. None of the standard types of nozzle assemblies arranged behind the tank was found to provide adequate coverage. Preliminary trials indicated that the best assembly would be a vertical " mast " of nearly the same height as the trees. An automatic " mast " fruit sprayer was designed and is here described

and illustrated. From experiments on its use the authors conclude that " (1) Automatic spraying of top fruit by means of high hydraulic pressure is satisfactory, provided the nozzle assembly, delivery of the pump and ' make-up ' of the tree are suitable. (2) A spray mast of height equal, or nearly equal, to the height of the tree is essential: such an assembly is not suited to many existing orchards. (3) For application of spray material from one side only of the machine, to bush trees of not more than about 15 ft. high, the delivery of the pump must not be less than 20 gallons per minute at a flow pressure of at least 250 lb. per sq. in."

2625. Kearns, H. G. H., and Morgan, N. G.
A lightweight spray nozzle (¼" B.S.P.) for " small " and " large " volume spraying.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 111-14, bibl. 3, illus.

A simple, lightweight, small volume nozzle is described and illustrated, which has been designed to facilitate cheap manufacture and to ensure a performance sufficiently uniform for practical purposes. The need for a nozzle of this type for applying small volumes of high concentration, as for example herbicides and systemic insecticides, is discussed.

2626. Anon.
A new British power duster.
World Crops, 1950, **2**: 44.

The Long Ashton Power duster, developed at the Long Ashton Research Station, is described briefly. It is claimed that applications of 1½ lb. per acre upwards can be distributed.

Fungicides.

(*See also* 2630.)

2627. Leach, J. G., and Yount, W. L.
The practicability of an all-purpose fungicide and insecticide dust for the home garden.
Repr. *Proc. W. Va Acad. Sci. biol. Sec.*, 1948, **20**: 48-53, being *Bull. W. Va Univ. ser.* **49**, No. 9-11, 1949.

Of the preparations tried, a dust containing copper (7%), rotenone (0·75%), and DDT (1%) appears to be the most promising.

2628. Groves, A. B.
Sulfur fungicides in fruit production.
Soil Sci., 1950, **70**: 67-72.

The author discusses, from the standpoint of a plant pathologist, such aspects as the character and types of materials available, the requirements of a fruit fungicide and the relation of sulphur to these requirements, and the present and prospective position of sulphur as a fungicide.

2629. Ciferri, R.
Potere anticrittogamico dell'esanitrodifenilamina e suo sinergismo coi sali di rami.
(The fungicidal action of hexanitrodiphenylamine and its synergism with copper salts.)
Not. Mal. Piante, 1950, No. 9, pp. 40-3, bibl. 3.

Data from spore germination tests show that the fungicidal action of ammonium hexanitrodiphenylamine and of copper sulphate is increased when the two are used together on six fungi, including *Sclerotinia fructicola* and *Fusicladium dendriticum*, but not on *Plasmopara viticola*.

Insecticides.

(*See also* 2627, 2766, 2767, 2807, 2835, 3054c, 3219.)

2630. Frear, D. E. H.
Newer pesticides: formulations, hazards, precautions and compatibility.
Prog. Rep. Pa agric. Exp. Stat. **29**, 1950, pp. 15.

Recently introduced insecticides, fungicides and herbicides are described: their toxicity and the precautions to be taken against poisoning are stressed, with a list of antidotes against poisons. The compatibility of common spray materials is tabulated.

2631. Hensill, G. S.
The " newer " organic insecticides.
Calif. Citrogr., 1950, **35**: 321, 352-3.

The following insecticides, their characteristics and some of their uses are briefly described: lindane (gamma isomer of BHC), TEPP (tetraethyl pyrophosphate), parathion, DDT, analogues of DDT (DDD and methoxy-DDT), BHC, toxaphene (chlorinated camphene), chlordan (chlorinated methanotetrahydroindane), rotenone, and nicotine.

2632. Foster, A. C.
How toxic to plants are some of the new insecticides ?
Agric. Chemls, 1950, **5**: 37-8.

The Senior Pathologist, Division of Fruit and Vegetable Crops and Diseases, Bureau of Plant Industry, etc., Beltsville, Md, concludes his discussion on the phytotoxic action of DDT, BHC, chlordan, toxaphene and other insecticides with the statement: " Indications are that some compounds may persist in soil for more than one season. Studies continue."

2633. Ripper, W. E.
A new systemic selective insecticide.
Manuf. Chem., 1950, **21**: 65-8.

For an abstract of a paper on the systemic insecticide bis(bisdimethylamino phosphonous) anhydride, marketed as Pestox 3, see *H.A.*, 20: 1550.

2634. Martin, H.
Systemic insecticidal properties induced in plants by treatment with fluorine and phosphorus compounds.
Reprinted from *Symp. Soc. exp. Biol.* No. 3, *Growth*, 1949, pp. 105-10, bibl. 10.

A review of work on this subject, together with an account of tests with bean aphid (*Aphis fabae*) on tick bean plants, and with lepidopterous larvae on cauliflower plants. The author concludes: " Clearly the poisonous properties which these systemic insecticides impart to the treated plants is a severe limitation to their practical utilization, though the non-fluorine phosphorus derivatives may be of use in seed production or in the raising of virus-free stocks. But their academic interest needs no emphasis, and their use, particularly if made from the radioactive P^{32}, will greatly facilitate the study of molecular transportation in plants."

2635. Smith, C. F., Jones, I. D., and Calvin, L. D.
Effect of insecticides on the flavor of peaches —1949.
J. econ. Ent., 1950, **43**: 179-81, bibl. 1.

At the Peach Research Laboratory, Eagle Springs, North Carolina, Elberta peaches were sprayed five times during the season with different combinations of materials which included parathion, chlordan, acid lead arsenate, BHC, sulphur and phygon. Results of taste tests made on fresh and canned fruits indicated that there were significant differences in the flavour of some peaches receiving different treatments, but the differences were considered to be of no economic importance. [From authors' summary.] [See also *H.A.*, 20: 1555.]

2636. Balachowsky, A.
La destruction des insectes auxiliaires entomophages par les traitements insecticides et ses conséquences. **(The effect of destroying entomophagous insects by insecticides.)**
C.R. Acad. Agric. Fr., 1950, **36**: 220-3, bibl. 15.

A discussion on the harm resulting from the destruction of insect parasites and predators of plant pests, by the insecticides applied to crops for the control of those pests, with special reference to the recently introduced organic insecticides such as DDT, HCH, SPC, parathion, etc.

2637. Dalmeyer, W. H. M.
De toepassing in de fruitteelt van emulsies van een geconcentreerde DDT-oplossing in minerale olie. **(Use of emulsions of DDT mineral oil concentrates in fruit growing.)** [Summaries in French, English and German ¾ p.]
Reprinted from *Meded. LandbHoogesch. Gent*, 1950, **15**: 1: 26-43, bibl. 8.

An account of the use of Shell Arkotine Emulsion. A 1% concentration applied in February to April gives excellent results on aphids which it controls as satisfactorily as fruit tree carbolineum or DNOC, but it does not control red spider. Applied just before the fruit harvest against pear blossom weevil, it does not leave white spots on the fruit as do the DDT wettable powders.

2638. Linsley, E. G., MacSwain, J. W., and Smith, R. F.
Comparative susceptibility of wild bees and honey bees to DDT.
J. econ. Ent., 1950, **43**: 59-62, bibl. 11.

In a preliminary series of tests one species each of *Nomia, Megachile, Melissodes, Anthidium*, and *Agapostemon* exposed to DDT in small cages for varying periods and concentrations, were more resistant than honey bees at the same exposures and concentrations. Where both sexes were present in sufficient numbers to provide comparative data the females were more resistant than the males. [Authors' summary.]—University of California.

2639. Marshall, G. E.
Nicotine bentonite-DDT combinations in the apple spray program.
J. econ. Ent., 1950, **43**: 227.

Observations on apple spray schedules, as worked out by the Purdue University and employed in Indiana and New Mexico.

2640. Merkenschlager, F.
Vorläufiger Bericht über Beobachtungen zur Wirkung von E 605-Präparaten durch die Institute für Obstbau und für gärtnerische Botanik und Pflanzenschutz an der Staatl. Lehr- und Forschungsanstalt für Gartenbau in Weihenstephan. **(Preliminary report on observations of the action of E605 preparations at Weihenstephan.)** [English and French summaries 1 p. each.]
Höfchen Briefe, 1950, **3**: 3: 3-8.

At the Weihenstephan Horticultural Research Station the following observations were made during 1949: (1) Carefully performed sprayings with E605 forte at 0·035% concentration against all types of aphids on several apple varieties were completely satisfactory; it possesses a good residual action, little affected by short periods of rain; no off-flavour due to treatment was detected in the fruit; no injury to man or warm-blooded animals occurred. (2) E605 forte in combination with various fungicides caused no injury to plants. (3) Better immediate control of plum sawfly was achieved with E605 forte than with hexa-preparations, and at the same time the appearance of various aphids was checked. Red spider mites on plums and damsons, while affected by these sprays, were not satisfactorily controlled in 1949. (4) E605 Folidol (0·25%) primarily used against small swarms of green aphid, while effective, was found inferior to E605 forte. (5) E605 dust, owing to absence of rain, gave excellent control of woolly aphid (*Eriosoma lanigerum*), being more satisfactory than spray.

2641. Rodrian, —.
Welche Erfahrungen wurden mit E 605-Verbindungen im Weinbau gemacht? **(Experiences gained in viticulture with E605.)**
Höfchen Briefe, 1950, **3**: 3: 11-15.

In a test in 1949 at the Viticultural and Horticultural Research Station, Oppenheim/Rhein, 100% control of the first generation of the grape berry moth (*Polychrosis*) was achieved with E605 dust, and 96% with spray (0·015%). A heavier attack of the second generation was also effectively controlled. No off-flavour was detected in most of the E605 plots, and no injury was caused to man.

2642. Gage, J. C.
The analysis of *p*-nitrophenyl thiophosphate, E 605, parathion.
Analyst, 1950, **75**: 189-91, bibl. 4.

The high toxicity of the insecticidal compound generally known as parathion or E605 has necessitated a sensitive method for its determination in the atmosphere or in edible crops. A method is described in which the compound in toluene solution is reduced to the corresponding amino compound, which is extracted into acid, diazotized and coupled with N-sulphatoethyl-*m*-toluidine. The coefficient of variation of a solution containing 5 μg. per ml. is of the order of 2%; the lower limit of sensitivity for the analysis of plant tissues depends upon the blank value for the material. [Author's synopsis.]—I.C.I. Ltd., Welwyn, Herts.

2643. Glass, E. H.
Parathion injury to apple foliage and fruit.
J. econ. Ent., 1950, **43**: 146-51, bibl. 1, illus.

During laboratory and field tests at the New York State Agricultural Experiment Station it was found that serious injury at normal dosages is limited to McIntosh and the related varieties Macoun, Kendall, Melba, Cortland and Early McIntosh. Sixteen other varieties were not affected at less than 5 to 20 lb. of 15% wettable powder per 100 gallons. It has been shown that the injury is probably due to the globules of parathion found floating free of solid particles in suspensions of parathion wettable powder. The addition of activated bentonite or activated charcoal ties up the globules and prevents foliage injury in the greenhouse and fruit injury in the field. Some evidence indicates that the injury is associated with rain following soon after application. [From author's summary.]

2644. Frey, W.
Über die Prüfung der geschmacksbeeinträchtigenden Wirkung von Hexa-Präparaten an Obst und Gemüse. **(Examination of the effect of hexa-preparations on the taste of fruit and vegetables.)**
NachrBl. dtsch. PflSchDienst. Braunschweig, 1950, **2**: 81-4, bibl. 6.

The determination of off-flavour in fruit and vegetables imparted by hexa-treatments. Short descriptions are given of methods of examining strawberries, gooseberries, currants, lettuce, radishes, peas, dwarf beans and kohl rabi.

2645. Meltzer, J.
Eigenschappen en giftigheid van hexachloorcyclohexaan. **(Properties and toxicity of hexachlorocyclohexane.)**
Tijdschr. PlZiekt., 1950, **56**: 101-48, bibl. 151.

The subject is reviewed in 10 chapters: (1) Introduction. (2) History of hexachlorocyclohexane. (3) Chemical and physical properties. (4) Toxicity towards arthropods. (5) Toxicity towards warm-blooded animals. (6) Physiological action of γ-HCH. (7) Duration of action of HCH. (8) Effect of HCH on the plant. (9) Effect of HCH on the microflora of the soil. (10) Effect on the flavour of crop products.

2646. Bottini, E., and Fantini, G.
Il gamma-esaclorocicloesano e la sua valutazione nei prodotti di clorurazione del benzene. **(γ-hexachlorocyclohexane and its determination in the chlorination products of benzene.)**
Ann. Sper. agrar., 1950, **4** (N.S.): 453-69, bibl. 14.

A discussion of methods of analysis commonly adopted with a note only of a new one being studied at the Stazione Chimico-Agraria Sperimentale of Turin. A further contribution is promised when the new trial is completed.

2647. Boyes, W. W., Jeffery, C. W., and Ginsburg, L.
Effect of dinitro-cresol spray on the storage quality of pears.
Fmg S. Afr., 1950, **25**: 173-6.

Two spray treatments were applied to 3 pear varieties on 30 August [late winter]: (i) 5 gal. winter oil emulsion plus 5 gal. lime-sulphur to 90 gal. water, and (ii) a ready mixed DNC oil emulsion containing 2·8% DNC at 5 gal. per 100 gal. water. Fruit from the subsequent crop was either ripened normally at air temperatures or stored at 31° F. and 34° F. for different periods and then ripened at 50° F. Maturity was measured by lb. pressure with a $\frac{5}{16}$ in. plunger. With Bon Chrétien pears, check samples kept at air temperatures ripened normally, as did fruit from trees sprayed with oil emulsion and kept in cold storage for up to 6 weeks. Fruit from the DNC-sprayed trees, however, failed to ripen normally after cold storage and showed various abnormalities. With Beurré Hardy and Winter Nelis, DNC did not appear to have any effect on ripening after cold storage, although their fruits, as well as those of Bon Chrétien, withstood slightly more pressure before going into storage than did fruit from the oil-sprayed trees. Experiments are continuing.—Western Province Fruit Research Station, Stellenbosch.

2648. David, W. A. L.
Insecticidal action of radioactive *bis*-(*bis*-dimethylamino)-phosphonous anhydride.
Nature, 1950, **66**: 72, bibl. 6.

The plants and insects used were chiefly broad beans infested with *Aphis fabae*, but some young cabbages infested with *Myzus persicae* and young peas with *Acyrthosiphum onobrychidis* were also studied. Most of the experiments were planned to show the translocation of the radioactive compound from the older leaves to the younger parts of growing plants. There is, however, similar, though less complete, evidence that the material is transferred also downwards to the older leaves. In strawberries the chemical was shown to pass from the leaves of the parent plant to those of the runner, especially when the runner is not rooted. Aphids killed by feeding on treated plants were found to be radioactive.—Agric. Res. Coun., Unit of Insect Physiol., Cambridge.

Spray residues.

2649. Hoskins, W. M.
Deposit and residue of recent insecticides resulting from various control practices in California.
J. econ. Ent., 1949, **42**: 966-73, bibl. 8.

Fruits and vegetables were analysed for residual contamination at the University of California, Berkeley. With all fruits tested DDT residue was well below 7 p.p.m. one month after application, and in most cases below 5 p.p.m. Dusts gave much lower deposits. Limited results with dichlorodiphenyl dichloroethane and methoxychlor were similar. Dried fruits may contain considerable DDT or dichlorodiphenyl dichloro ethane except in cases of prunes, where the lye treatment probably destroys the chemicals. Chlordan seems to deposit more heavily than DDT and is fairly persistent. Boxed raisins treated with DDT on the outside indicated that this substance could spread by volatilization. Parathion disappears rapidly. Vegetables grown on soil containing a large amount of DDT did not absorb

any of it. Results of tests on individual products are tabulated.

2650. Gunther, F. A., Barnes, M. M., and Carman, G. E.
Removal of DDT and parathion residues from apples, pears, lemons, and oranges.
Reprinted from *Advances Chem. Ser.*, 1950, **1**: 137-42, bibl. 19, being *Pap. Calif. Citrus Exp. Stat.* **623.**
Alkaline and halogen-carrier media, such as sodium silicate, trisodium phosphate, ferric chloride, sodium carbonate and bicarbonate, and alkaline soaps were used for chemical removal of DDT deposits. Mechanical removal was sought by using emulsifying agents, detergents, pressure sprays, and scrubbing brushes. Solvent removal attempts included the use of kerosene, mineral oil, xylene, and polymethylated naphthalenes. With apples and pears, sodium silicate frequently proved superior, removing as much as 90% of the residual surface DDT, and an alkaline soap effected significant removal from oranges. No experimental treatment has afforded significant removal of parathion from treated fruits. [Authors' summary.]

2651. Gunther, F. A., and Blinn, R. C.
Mass-production techniques for estimation of parathion residues.
Reprinted from *Advances Chem. Ser.*, 1950, **1**: 72-87, bibl. 8, being *Pap. Calif. Citrus Exp. Stat.* **627.**
" The magenta colour reaction for parathion has been adapted to mass-production techniques for quantitative estimation of parathion residues in and on certain fruits, vegetables, and miscellaneous substrates."

2652. Carman, G. E., and others.
Absorption of DDT and parathion by fruits.
Reprinted from *Advances Chem. Ser.*, 1950, **1**: 128-36, bibl. 22, being *Pap. Calif. Citrus Exp. Stat.* **625.**
Absorption of insecticide residues of DDT and parathion by fruit was investigated. Specific techniques for the physical separation of component fruit parts with minimization of sample contamination are described. The relatively rapid penetration of the toxicants was followed by a slower loss with the retention of appeciable amounts over long periods of time. Neither DDT nor parathion was found in the pulp of apples, pears, or peaches following treatment with standard dosages in sequence applications. Spectrographic examination of transmission-wavelength curves of the benzene extractives of DDT-treated and parathion-treated navel oranges in comparison with curves for parent compounds indicated definite shifts in absorption bands. [From authors' summary.]

2653. Barnes, M. M., and others.
Fruit surface residues of DDT and parathion at harvest.
Reprinted from *Advances Chem. Ser.*, 1950, **1**: 112-16, bibl. 7, being *Pap. Calif. Citrus Exp. Stat.* **624.**
Surface residues of DDT and parathion at various times during the season and at harvest were determined for apples, pears, peaches, oranges, and lemons. Low level surface residues of parathion on apples were not carried over into cider. Harvest residues on fresh fruit are distinguished from residues present in food at the time of consumption which are included under the designation ultimate residues. [Authors' summary.]

Insecticidal plants.

2654. Bottger, G. T., and Jacobson, M.
Preliminary tests of plant material as insecticides.
Publ. U.S. Dep. Agric., agric. Res. Administ., Bur. Ent. Plant Quar. **E-796,** 1950, pp. 35.
Tests were carried out on a number of pests of crop plants. The plants and parts tested and the percentage of insects killed are tabulated.

2655. Virot, R.
Les plantes ichtyotoxiques en Nouvelle-Calédonie. **(Plants providing fish poisons in New Caledonia.)**
Rev. int. Bot. appl., 1950, **30**: 86-8, bibl. 2.
Three latex-bearing plants are used in New Caledonia to provide fish poisons, namely *Excoecaria agallocha* L., *Euphorbia kanalensis* Boiss., and *Cerbera manghas* L.

2656. Plank, H. K.
Experiments with mamey for pests of man and animals.
Trop. Agriculture Trin., 1950, **27**: 38-41, bibl. 10, illus.
Powdered mature seeds of mamey, *Mammea americana* L., and a water infusion of sliced or grated half-ripe fruits proved as effective, but not quite so permanent, as a 1% suspension of DDT in the control of ticks and fleas on dogs.—Fed. Exp. Stat., Mayaguez, Puerto Rico.

2657. Page, A. B. P., and Blackith, R. E.
Stabilization of pyrethrins.
Pyreth. Post, 1950, **2**: 1: 18-20.
Interim report on work carried out at the Imperial College of Science and Technology.

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A rapid and accurate method for determination of nicotine in a large number of plant or dust samples is described.—Imperial College of Science and Technology, London.

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J. econ. Ent., 1950, **43**: 139-45.
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Plant Dis. Reptr, 1950, **34**: 35-6, bibl. 24.

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Antibacterial and antifungal activity of benztropolone.
Nature, 1950, **66**: 65, bibl. 5.

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A preliminary study of the effects of certain insecticides upon wildlife in north central Oklahoma.
Proc. 37th annu. Mtg Okla Acad. Sci. for 1948, 1950, pp. 6-10, bibl. 3.

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Search for insecticides: chemical constitution and insecticidal activity.
J. Sci. Fd Agric., 1950, **1**: 178-82, bibl. 8.

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Life cycle studies on the pecan nut casebearer, *Acrobasis caryae* Grote.
Proc. 37th annu. Mtg Okla Acad. Sci. for 1948, 1950, pp. 32-5.

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An examination of polymerized pyrethrins.
J. Sci. Fd Agric., 1950, **1**: 137-9, bibl. 10.

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Come agiscono gli anticrittogamici. **(The action of fungicides.)**
Humus, 1950, No. 3, pp. 17-19, illus.
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A catalogue of the parasites and predators of insect pests. Section I. Parasite host catalogue. Part 5, Parasites of the Lepidoptera (A-Ch), 1944, pp. 130. ***Part 6, ditto (Ci-F), 1945,*** pp. 131-258. ***Part 7, ditto (G-M), 1946,*** pp. 259-385. ***Part 8, ditto (N-P), 1946,*** pp. 386-523. ***Part 9, ditto (Q-Z), 1947,*** pp. 524-627. ***Part 10, Index of parasites of the Lepidoptera, 1950,*** pp. 107. Obtainable from Commonwealth Agricultural Bureaux, Central Sales Branch, Farnham House, Farnham Royal, Bucks. 10s. each. [For previous lists, see *H.A.*, 14: (1185).]

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Contrôle biologique des insecticides. Méthodes de laboratoires standardisées aux U.S.A. **(Bio-assay control of insecticides. The standardized methods of the U.S.A. laboratories.)**
Parasitica, 1950, **6**: 43-50.
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The insect faunas of the dried roots of *Lonchocarpus* and *Derris*.
Col. Plant Anim. Prod., 1950, **1**: 33-51, bibl. 50, illus.

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Plant diseases in Texas and their control.
Circ. Tex. agric. Exp. Stat. **124,** 1949, pp. 74.
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Analysis of undried pyrethrum flowers.
J. Sci. Fd Agric., 1950, **1**: 155-6, bibl. 2.

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Azione del freddo su foglie di vite. **(The effect of cold on vine leaves.)** [English summary 6 lines.]
Ann. Sper. agrar., 1950, **4** (N.S.): 667-73, bibl. 6.

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J. chem. Soc. Lond., 1950, pp. 1769-72.

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Der heutige Stand der Schädlingsbekämpfung. **(The present position of pest and disease control [in Germany].)**
NachrBl. dtsch. PflSchDienst Berlin, 1950, **4**: 63-7, bibl. 6.

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Modificazioni anatomiche in foglie di pesco colpite da freddo. **(Anatomical irregularities in peach leaves induced by cold.)** [English summary ¼ p.]
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Antibiotics and plant protection.
World Crops, 1950, **2**: 194-7, illus.

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Di-(*p*-chlorophenyl)methylcarbinol, a new miticide.
Science, 1950, **111**: 361-2, bibl. 5.
A preliminary report on its chemical properties.

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Mass estimation of DDT surface and penetration residues.
Reprinted from *Advances Chem. Ser.*, 1950, **1**: 88-92, bibl. 5, being *Pap. Calif. Citrus Exp. Stat.* **626.**

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The spring *Tiphia*, an imported enemy of the Japanese beetle.
Publ. U.S. Dep. Agric., agric. Res. Administ. Bur. Ent. Plant Quar. **E-799,** 1950, pp. 8, illus.

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Virussjukdomar hos fruktträd och bärväxter. **(Virus diseases of top and small fruit.)**
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Arch. Biochem., 1950, **27**: 247-54, bibl. 10, being *J. Ser. Pap. Vt agric. Exp. Stat.* **9.**

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Sperimentazione orientativa antidacica con insetticidi organici clorurati distribuiti sul terreno o in esso incorporati. **(Tentative trials of olive fly control by chlorinated organic compounds dusted on the soil or incorporated in it.)** [English summary ½ page.]
Ann. Sper. agrar., 1950, **4** (N.S.): 153-64.
Limited success achieved with DDT and hexachlorocyclohexane.

2661.

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Advances in chemical methods of crop protection.
J. Sci. Fd Agric., 1950, **1**: 163-7, bibl. 19.
Systemic insecticides and fungicides and parathion.

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Present status of orchard insecticides.
Proc. 91st annu. Mtg Pa St. hort. Ass., 1950, pp. 91-6.

c DI PRIMA, S.
Su alcuni effetti nocivi dell'esaclorocicloesano per le piante. **(Some harmful effects of hexachlorocyclohexane.)** [English summary 10 lines.]
Ann. Sper. agrar., 1950, **4** (N.S.): 307-20.
Peas, soybeans and castor beans among the experimental material.

d ROSE, D. H., AND OTHERS.
Market diseases of fruits and vegetables: peaches, plums, cherries and other stone fruits.
Misc. Publ. U.S. Dep. Agric. **228,** 1950, pp. 27, bibl. 69, illus.
First issued in 1937 [*H.A.*, 7: 1073], now revised and slightly enlarged.

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Sygdomme og skadedyr paa stikkelsbaer. **(Diseases and pests of gooseberries [in Denmark].)**
Dansk Havebr., 1950, **9**: 68-70, being *Medd. Statens Forsøgsvirks. Plantekult.* **440.**

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Anwendungsmethoden des Alpha-Naphthylthioharnstoffs in der Nagetierbekämpfung. **(Application methods of alpha-naphthylthiocarbamides in rodent control.)**
NachrBl. dtsch. PflSchDienst. Braunschweig, 1950, **2**: 102-5, bibl. 6.

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Gli esperimenti svizzeri per combattere la grandine. **(Swiss experiments on protection against hail.)**
Humus, 1950, No. 4, pp. 23-5.

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Der kleine Frostspanner und seine Bekämpfung. **(The winter moth [*Operophthera brumata*] and its control.)**
Flugbl. biol. Bundesanst. Braunschweig **K 19,** 1950, pp. 6, illus.

i TUNBLAD, B.
Från årets vinterbesprutningar. **(The 1948-49 trials with winter washes.)**
Växtskyddsnotiser, 1949, No. 5, pp. 1-5.
Discussion of routine tests with proprietary winter washes.—Swedish Plant Protection Station.

j UNITED STATES DEPARTMENT OF AGRICULTURE.
Interpretations of the regulations for the enforcement of the federal insecticide, fungicide, and rodenticide act.
Service and Regulatory Announcement U.S.D.A. **167,** pp. 52.

k ZEUMER, H., AND FISCHER, W.
Normen für Pflanzenschutzmittel. **(Approved standards for fungicides and insecticides.)**
NachrBl. biol. Zentralanst. Braunschweig, 1949, **1**: 107-12, and *NachrBl. dtsch. PflSch-Dienst. Braunschweig*,* 1950, **2**: 40-4, 113-17, bibl. 16.

* Note change of name in second volume !

WEEDS AND WEED CONTROL.

Herbicides.

(*See also* 2230, 2239-2243, 2250, 2630, 3427, 3431.)

2662. Norman, A. G., Minarik, C. E., and Weintraub, R. L.
Herbicides.
Annu. Rev. Plant Physiol., 1950, **1**: 141-68, bibl. 340.

The fact that most of the 340 papers cited in this review of the literature appeared between 1946 and 1949 may be taken to indicate the widespread interest aroused in the subject in recent years. In considering the current status of herbicides the authors discuss herbicidal agents under the following headings: inorganic compounds, oils, phenols, phenoxyacetic acids (hormone-type herbicides), carbamates, trichloroacetates, other organic compounds and combinations. The uses of herbicides are discussed under the headings of non-selective eradication, selective weed control in growing crops, and the prevention of seedling establishment. The persistence of herbicides in the soil is considered, as are the types of equipment used to apply them. In reviewing work on the physiological aspects of herbicidal use, studies are described briefly on modes of entry, translocation, and mechanism of action in the plant. Certain aspects of the subject which have so far received relatively little attention are emphasized, and probable lines of future development are indicated.

2663. Tilemans, E.
La lutte chimique contre les mauvaises herbes. **(Weed control.)**
Parasitica, 1950, **6**: 63-74.

A general review of herbicides and their action, followed by lists showing the chief weeds susceptible to DNC and to plant hormones, with their scientific and French and Dutch common names.

2664. Statens Forsøgsvirksomhed i Plantekultur.
Hormonpraeparater til bekaempelse af ukrudt. **(Hormone weedkillers.)**
Dansk Havebr., 1950, **9**: 108-10, being *Medd. Statens Forsøgsvirks.* **417.**

Some hormone weedkillers on the Danish market are listed and dosages are recommended for different purposes. The susceptibility of many weeds to these and certain other herbicides is recorded.

2665. Blackman, G. E.
Selective toxicity and the development of selective weedkillers.
Reprinted from *J. roy. Soc. Arts*, 1950, **98**: 500-17, bibl. 14.*

In his inaugural Fernhurst Lecture to the Royal Society of Arts, Professor Blackman gives an account of the more recent developments in weed control by selective herbicides, which are characterized by the discrepancy between the rapid advance in practical achievements and the slow progress in fundamental understanding of the physiological processes involved. Experiments with linseed have shown that resistance to selective weedkillers is a genetically determined characteristic, at least in certain plants. This finding opens up new perspectives for the breeder, but it foreshadows at the same time the development of resistant weed strains. Another unpleasant prospect is that the eradication of one type of weed may be followed by the establishment of some other type. This observation was made in California, where continued spraying of roadsides with mineral oils has killed out the original vegetation only to have it replaced by oil-resistant umbelliferous weeds. Again in California the exclusive use of dichlorophenoxyacetic acid in fields has resulted in the increase of monocotyledonous weeds in place of the dicotyledonous weeds which had been destroyed. A "rotation" of herbicides should therefore be practised wherever an alternative weedkiller is available.

* Reprinted in full in *N.A.A.S. quart. Rev.*, 1950, No. 8, pp. 139-53. An extract of the paper appeared in *Manuf. Chem.*, 1950, 21: 161-4.

2666. Easterbrook, B.
Hormone weedkillers and their uses.
Qd agric. J., 1950, **70**: 262-73.

A general account, based largely on foreign experience, is given of the use of hormone weedkillers in crops and pastures with notes on equipment and on the sources of supply in Queensland, formulations and costs of methoxone, 2,4-D and 2,4,5-T. Extensive lists are given of susceptible and resistant weeds and the quantities of active principle needed per acre to control the former.

2667. Smolák, J.
Fytohormony ve službách rostlinné ochrany. **(Plant hormones in the service of plant protection.)**
Ochr. Rost., 1950, **23**: 168-72, bibl. 7.

A review of work done on plant hormones with special reference to selective weedkillers, and the prevention of premature fruit fall.

2668. Ciferri, R.
Sensibilità di piante coltivate, spontanee ed infestanti al "2,4-D" e derivati. **(The sensitivity of cultivated and wild plants and weeds to 2,4-D and its derivatives.)**
Not. Mal. Piante, 1950, No. 9, pp. 44-56.

After a discussion on the action of 2,4-D on plants, a list is given of 618 species showing whether they are very susceptible, susceptible, moderately susceptible, moderately resistant, resistant, or very resistant to applications of 2,4-D.

2669. Solomon, S., and Rao, M. V. V.
New methods of weed control.
Poona agric. Coll. Mag., 1950, **40**: 4: 40-4.

Methods of weed control, particularly with selective herbicides, are discussed, and 31 local weeds found at Poona to be susceptible to 2,4-D are listed with both Indian and Latin names, strength of 2,4-D used and notes on symptoms preceding death.

2670. Hanf, M.
Keimung von Unkräutern und Kulturpflanzen nach Behandlung des Bodens mit 2,4 D-Mitteln. **(Germination of weeds and cultivated plants after 2,4-D treatment of the soil.)**
NachrBl. dtsch. PflSchDienst. Braunschweig, 1950, **2**: 84-90.

Normal applications of 2,4-D prevent or strongly hinder the germination of weed seeds without seriously retarding cereals. Vegetable seeds (beans, carrots, radishes) are similarly affected. 2,4-D remains active for some time, but is gradually washed deeper into the soil by rain, allowing the later sown or planted vegetables to grow well. Heavy watering can hasten this process, and so keep plots free from weeds for months, growing healthy vegetables.—Plant protection service, Hesse-Nassau.

2671. AUDUS, L. J.
Biological detoxication of 2,4-dichlorophenoxyacetic acid in soils: isolation of an effective organism.
Nature, 1950, **166**: 356, bibl. 6.
2,4-D was shown to be broken down in culture and in the soil by a common soil organism of the *Bacterium globiforme* group.—Bedford College, London University.

2672. VERONA, O.
Effetti di alcuni erbicidi selettivi sulla microflora, in particolare, del terreno. **(Effects of some selective weedkillers on micro-organisms, with special reference to those of the soil.)**
Ann. Fac. Agrar. Pisa, 1948, **9**: 189-99, from abstr. in *Soils and Ferts*, 1950, **13**: 237.
Observation effects of four proprietary weedkillers of the 2,4-D and dinitrocresol types applied to field soil at customary rates showed no diminution of numbers of the chief groups of fungi and bacteria including azotobacter. One of these materials (composition not specified) was found to have some microbicidal action *in vitro*.

2673. FOGG, G. E.
The penetration of 3: 5-dinitro-*o* cresol into leaves.*
Ann. appl. Biol., 1948, **35**: 315-30, bibl. 20.
It was found that penetration of 3: 5-dinitro-*o*-cresol from spray solutions or suspensions into leaves of charlock (*Sinapis arvensis*) through the stomata is unimportant. Lethal amounts may enter from aqueous solution by simple diffusion of the undissociated phenol through the epidermis, which behaves as a homogeneous lipide membrane.

2674. CURRIER, H. B., AND CRAFTS, A. S.
Maleic hydrazide, a selective herbicide.
Science, 1950, **111**: 152-3, bibl. 1, illus.
In preliminary trials at Davis, Calif., spraying with 0·2% maleic hydrazide killed young plants of barley, water grass (*Echinochloa crus-galli*) and Johnson grass (*Holcus halepensis*), and damaged but did not kill older plants of the last two. It inhibited growth of cotton in the cotyledon stage but had no effect on older cotton plants. With barley the addition of 0·024% Vatsol as a spreader caused more rapid killing.

2675. ZUKEL, J. W.
Use of maleic hydrazide as a plant growth inhibitor.
Agric. Chemls, 1950, **5**: 5: 35-6, 84, bibl. 2, illus.
Maleic hydrazide shows a selective herbicidal and growth inhibitory effect on plants. Young plants are more susceptible. Older plants may fail to develop seeds or rhizomes and show less effect on vegetative growth. The chemical appears to be translocated to affect differentiating tissues either temporarily or permanently, depending on the dosage used. Preliminary data indicate that maleic hydrazide might be useful as a selective grass herbicide, as a temporary inhibitor of plant growth and as a method of preventing formation of undesirable seed and sprouting of tubers in storage. [Author's conclusion.]

* Previously omitted in error.

2676. BOHMONT, D. W.
Herbicidal properties of shale oil fractions.
Agron. J., 1950, **42**: 179-82, bibl. 4, illus.
Results of foliage applications on bean plants show that naphtha, kerosene and gas-oil fractions of shale oil vary in their degrees of phytotoxicity as well as in the type of plant injury, which can be acute and chronic. The acute toxicity characterized by a rapid initial burning of the leaves is caused by heavy concentrations of the naphtha fraction; the chronic toxicity characterized by a slow yellowing of the leaves and a gradual decline in plant vigour is caused by both the kerosene and the gas-oil fractions of shale oil. Concentrations which may be applied with minimum plant injury differed among the three fractions. The 10% emulsion of the naphtha caused plant damage equal to the 5% emulsion of the kerosene or the 1% emulsion of the gas oil. [From author's summary.]—University of Wyoming.

2677. BELL, J. M., AND NOREM, W. L.
Petroleum weed killers.
Agric. Chemls, 1950, **5**: 4: 31-4, 99, 101; **5**: 5: 47-9, 96-7, bibl. 8.
Petroleum products having an aromatic content between 10% and 20% and boiling between 300° F. and 400° F. are satisfactory for use in selectively killing weeds in carrots and other umbelliferous crops. General contact weedkillers usually have 40% or more aromatics and boil between 350° F. and 700° F. Diesel fuels with an API gravity of 32° are being used, but better results are obtained with other products having gravities below 25°. Petroleum products with the same general boiling range as the selective herbicides but with an aromatic content above 70% may be used for the control of submerged water weeds in irrigation and drainage ditches and reservoirs. [From authors' summary.]

2678. JONES, R. L., AND OTHERS.
The relationship between the constitution and the effect of chemical compounds on plant growth. 2. Quaternary ammonium salts.
Biochem. J., 1950, **47**: 110-14, bibl. 11.
The herbicidal activity of quaternary ammonium salts has been examined by a laboratory seed-germination technique, using rape and oats. In the homologous series of *n*-alkyltrimethyl ammonium salts, activity against both species rose as the series was ascended. In the case of rape, activity diminished after C_{14}. In the case of oats the position of the maximum was not determined, but it appeared to be higher. In a series of quaternary salts containing benzyl or substituted benzyl radicals, oat seeds were more susceptible than rape. In contrast to the results in the phenoxyacetic

acid series, the herbicidal activity was but little affected by the introduction of substituent groups (e.g. chlorine) into the benzene ring. A sulphonic acid group brought about complete inactivation. The activity was greatly influenced by the nature of the other substituent groups on the nitrogen atom. The results are discussed in relation to the known ability of certain quaternary salts to alkylate thiol groups. [Authors' summary.]

2679. LOUSTALOT, A. J., AND FERRER, R.
Studies on the persistence and movement of sodium trichloroacetate in the soil.
Agron. J., 1950, **42**: 323-7, bibl. 5, illus.

Controlled greenhouse and field experiments were conducted to study the effect of temperature, soil moisture, and texture on persistence and movement in the soil of sodium trichloroacetate (TCA), a promising new herbicide for the control of noxious perennial grasses. The toxicity of TCA decreased more rapidly at higher temperatures and in damp soils than at low temperatures, and when applied to air-dry soil it appeared to increase. It persisted longer in clay soil than in sandy soil or sandy-clay mixture. In the absence of rain TCA did not move beyond the second inch, though with ½ or 1 inch of rain it moved down to at least 8 inches. This new herbicide was found to be more toxic to grasses than to broadleafed plants.—Federal Experiment Station, Mayaguez, P.R.

Apparatus.

(*See also* 2625, 2706.)

2680. OATES, W. J., AND WITT, R. H.
Farm sprayer for weed control.
Bull. Okla agric. Exp. Stat. **B-328**, 1949, pp. 15, illus.

The construction is described of a low pressure tractor-mounted sprayer that can be used for both weed and insect control, and that can be built easily and inexpensively on the farm.

2681. RALEIGH, S. M., AND PATTERSON, R. E.
Apparatus for spraying small plots.
Prog. Rep. Pa agric. Exp. Stat. **30**, 1950, pp. 3, illus.

The construction is described of a home-made device for applying a definite amount of herbicide per area to experimental plots. The boom, supported at a definite distance above the soil, covers the entire width of the plot, and is constructed so that the spray from all nozzles starts and stops at the same time.

Particular weeds.

(*See also* 3412.)

2682. DU TOIT, R.
Fine-bristled burgrass, a new weed.
Fmg S. Afr., 1950, **25**: 139-40, illus.

Fine-bristled burgrass, *Cenchrus brownii* (*C. viridis*) is described. Introduced into the Union about 4 years ago, it is a proclaimed weed, and an effort is being made to eradicate it by digging and burning before plants reach the seeding stage. This is thought to be a more practical method of eradication than spraying with herbicides, although an I.C.I. preparation, A.C.P., formula T.C.A. 60, has been tried with fair success.

2683. JOHNSON, A.
Blackberry control using 2: 4: 5-trichlorophenoxyacetic acid formulations.
J. Aust. Inst. agric. Sci., 1949, **15**: 158.

Two esters of 2,4,5-T have been successfully used by the N.S.W. Department of Agriculture in blackberry control trials.

2684. HUDSON, J. P.
Eradication of oxalis.
Fruitgrower, 1950, No. 2847, pp. 85-6, bibl. 2.

The spreading of oxalis is causing concern to growers in the west of England. While some suggestions of chemical control are made, the safest eradication methods seem to be hand or mechanical destruction. Hormone weedkillers used in the normal way are ineffective.

2685. GRIGSBY, B. H.
Control of crabgrass (*Digitaria* spp.) by the use of chemical sprays.
Quart. Bull. Mich. agric. Exp. Stat., 1950, **32**: 479-85, bibl. 3.

Two or more applications of 2-3 quarts of L-2988 [a petroleum fraction supplied by the Standard Oil Company, designated as " Standard Crabgrass Spray "] per square rod are suggested as the most satisfactory selective control of crabgrass. For renewing lawns, petroleum naphtha such as Stoddard solvent as a grass killer is recommended.—Michigan Agricultural Experiment Station.

2686. DU TOIT, R.
Lantana as a weed.
Fmg S. Afr., 1950, **25**: 163-4, illus.

Lantana camara Linn., which has escaped from cultivation as an ornamental shrub and become troublesome as a weed in Natal, is described.

Weed control in vegetables.

(*See also* 2882.)

2687. SWEET, R. D.
Current status of chemical weeding of vegetables.
Proc. 3rd Mtg East. Sect. nat. Weed Cttee, Ottawa, 1950, pp. 69-72, bibl. 1.

The author, associate professor of vegetable crops, Cornell University, states the objective of chemical weeding, reviews the present use of herbicides, and calls for further research work.

2688. COMBS, O. E.
Weeding vegetables with chemicals.
Wis. Hort., 1950, **40**: 230.

Under certain conditions, with certain weeds, with proper precautions and to a more or less satisfactory degree, a number of vegetables may be weeded with chemicals. A list of vegetables for which chemical weeding is satisfactory is given, and operations and materials are described for weed destruction in asparagus, beets, carrots, onions and beans.—Department of Horticulture, University Wisconsin.

2689. ROBB, O. J.
Notes on the use of special oils for pre-emergence weed sprays with seeded vegetable crops.
Proc. 3rd Mtg East. Sect. nat. Weed Cttee, Ottawa, 1950, pp. 66-7.

Stoddard Solvent applied after sowing and just before emergence gave good control for 2 weeks in onion, beet, carrot, spinach, lettuce and radish crops in a test carried out at the Horticultural Experiment Station, Vineland, Ontario, in 1947. To maintain control over longer periods without injury to the growing crop, further tests were made in 1949 with a high aromatic oil from the Imperial Oil Company (QxS-16) and the Shell Agriculture Weed Killer No. 3, which contains a percentage of pentachlorophenol. Spraying was done some days before sowing and repeated soon afterwards. QxS-16 sprayed 2 weeks after planting gladiolus corms gave excellent control of weeds and grasses for over 3 weeks, without injuring the few emerging tips.

2690. Berggren, G. H., and Dutt, J. O.
Chemical weed control in farm crops and vegetables.
Circ. Pa agric. Ext. Serv. **356,** 1950, pp. 17, illus.

Information is supplied to the grower on the physical and chemical properties of herbicides, the relative susceptibility of various crops and weeds to 2,4-D, the control of special weed pests, and spraying equipment. Recommendations are made for weed control in farm and garden crops, including asparagus, beets, carrots, sweet corn, onions, peas and potatoes.

2691. Davis, G. E., and Smith, O.
Toxicity of 2,4-D in respect to the carbohydrate level of red kidney bean seedlings.
Mem. Cornell agric. Exp. Stat. **293,** 1950, pp. 20, bibl. 17.

(1) The carbohydrate content of plants held in the dark for 36 hours was reduced to the point that 2,4-D applied to intact leaves was ineffective. (2) Mixtures of sugars, particularly sucrose, and 2,4-D were lethal when applied to a starved plant. (3) Starved plants were killed when 2,4-D was applied through the cut end of a petiole, or when it was applied through a sliver of the hypocotyl. Plants growing in normal day and night and treated through the hypocotyl seemed to resist death and grew abnormally. (4) Absence of toxic symptoms when shaded plants were treated, as reported previously, was probably due to failure of absorption and/or translocation. Instances in which shaded plants were killed more rapidly indicate that the physiological condition of the plant was such that 2,4-D was absorbed and translocated, and because of low carbohydrates it was therefore extremely toxic. (5) Respiration was stimulated by treatment of starved plants. The degree of stimulation appears to be correlated somewhat with the length of starvation before treatment. (6) When starved plants were treated through the hypocotyl the manner of death suggests that 2,4-D is strongly toxic to the protoplasm. Semi-permeability appeared to be destroyed, which caused exudation of cell sap and eventual collapse of the tissue. [Authors' summary.]

2692. Swanson, C. L. W., and Jacobson, H. G. M.
Influence of cultivation and weed killers on soil structure and crop yield.
Soil Sci., 1950, **69**: 443-57, bibl. 11.

A report of 1 year's study on the effect of using 2,4-D and flaming on corn and carrots and their indirect effect on soil structure as compared with cultivation methods. On the basis of the data obtained the experiment has been revised and will be continued for some years.—Connecticut Agric. Exp. Stat.

2693. Dearborn, C. H.
Chemical weed control in peas, sweet corn, and beets grown for processing.
Bull. N.Y. St. agric. Exp. Stat. **741,** 1950, pp. 37, bibl. 16, illus.

Peas: Field trials carried out during 1947-49 showed that wild mustard could be successfully controlled in peas by a single spray, when the crop was 4-8 in. high, of sodium chloride, ammonium dinitro ortho secondary butyl phenate, potassium cyanate, and a mixture of sodium chloride and sodium nitrate. Finely powdered calcium cyanamid dispersed from an aeroplane also gave good control of mustard when weather conditions were favourable. The destruction of wild mustard, lamb's quarters, red-root and ragweed was best accomplished by dinitro ortho secondary butyl phenate. The salt sprays caused no burning on the peas but did not control lamb's quarters. The results of preliminary tests with 2,4-D justify further field trials. *Sweet corn:* Sprays of 0·6-0·8 lb. 2,4-D acid equivalent per acre, applied to Golden Cross Bantam sweet corn when it was breaking ground, or up to 8 in. tall, effectively controlled broadleaved weeds. Similar sprays were used successfully when the plants were 2 ft. tall without reducing the yield. Cultivation to control grasses was required. Sprays of 2,4-D applied in conjunction with cultivation but following the stirring of the soil inhibited weed growth longer than similar sprays mixed with the soil by the cultivator. *Beets:* Sodium chloride (400 lb. in 200 gal. water per acre) and sodium chloride plus sodium nitrate (320 lb. and 240 lb. respectively in 200 gal. water per acre) effectively controlled broadleaved weeds and grasses in beet, with the exception of lamb's quarters and purslane. The sprays did not affect stand or yield of beet provided it had developed 2 true leaves. Information gained on the use of spray equipment is given.

2694. Altona, R. E.
A preliminary report on the control of weeds in maize with Methoxone and 2,4-D.
S. Afr. J. Sci., 1950, **46**: 295-6.

At Frankenwald in 1948-49 the Na salt of 2,4-D and Agroxone (10% solution of Methoxone) were applied at a rate of 1 lb. active principle per acre 5 days before planting, at planting, 5 days after planting or when the maize plants were 18 in. high compared with untreated and uncultivated control plots. Both chemicals gave equally good control of weeds and increased yields, the applications 5 days before and 5 days after planting the maize being best. The pre-emergence applications also delayed the appearance and reduced the occurrence of the sedge *Cyperus esculentus* and the grass *Eleusine indica* and apparently suppressed germination of seeds of *Eragrostis*.

2695. Mašková, J.
Studie o telemorfickém působení hormonálních herbicidů v klíčních rostlinách hrachu. **(Studies on the telemorphic action of hormone herbicides in pea seedlings.)** [English summary 4 pp., Russian summary 1¼ p.]
Acta Univ. Agric. Silvic. Brno, Sign.C46, 1949, pp. 48, bibl. 39, illus.

Seedlings of *Pisum sativum*, green var. Selecta, grown mainly in water culture, were treated with 2,4-D, MCPA and IPC in differing concentrations, applied to various parts of the plant. The work was carried out at the Botanical Institute of Brno University, Czechoslovakia, in the spring and summer of 1949, by means of water cultures in a greenhouse and laboratory dark room. The abnormalities induced are described. Paste of 2,4-D applied to the cut surface of the first epicotyl internode showed more pronounced effects than when applied to the uncut apex, the longer internodes reacting less than the shorter ones. Cotyledons reacted similarly, whether cut or whole. When the paste was applied to the base of the roots, the response was greater than when applied near the tip. MCPA gave similar results. By contrast, IPC induced only local toxic effects; in strengths of 0·0025-0·01% root growth ceased temporarily, but it started again when the plants were transferred to pure water; high concentrations, 10-50%, were needed to induce tumour formation, but without initiation of root primordia. [From author's summary.]

2696. LEEFE, J. S.
Pre-emergence and post-emergence treatments for weed control in canning peas.
Proc. 3rd Mtg East. Sect. nat. Weed Cttee, Ottawa, 1950, pp. 59-61.

The principal weeds in peas being grown for canning in the Annapolis Valley, Nova Scotia, are: wild radish (*Raphanus raphanistrum*), lamb's quarters (*Chenopodium album*) and spurrey (*Spergula arvensis*). Results of tests made with various herbicides for their control were unsatisfactory. The pre-emergence treatments with granular cyanamide or 2,4-D gave good control of early weeds, but the peas did not grow fast enough to smother the second lot. None of the post-emergence treatments were satisfactory.

2697. FERGUSON, W., AND OTHERS.
Some results on the use of granular calcium cyanamide as a pre-emergence treatment for weed control in peas, beans and sweet corn.
Proc. 3rd Mtg East. Sect. nat. Weed Cttee, Ottawa, 1950, pp. 61-6.

While the results of tests made at the Dominion Experimental Stations, Quebec, Nova Scotia and B.C., and at the Central Experimental Farm, Ottawa, Ontario, varied, in some cases considerably, they indicate certain promise in pre-emergence treatment with granular calcium cyanamide for weed control in peas, beans and possibly in sweet corn.

2698. CHIASSON, T. C.
The effect of 2,4-D on potato varieties.
Proc. 3rd Mtg East. Sect. nat. Weed Cttee, Ottawa, 1950, p. 66.

The trial had to be abandoned before conclusive results were reached.

2699. ERICKSON, L. C., AND GAULT, H. S.
The duration and effect of 2,4-D toxicity to crops grown on calcareous soil under controlled irrigation conditions.
Agron. J., 1950, **42**: 226-9, bibl. 5.

Toxicity decreased rapidly in soil under irrigation. Of the test crops alfalfa was found to be the most sensitive, followed by beans, oats, corn, and potatoes, in that order, though this order was not maintained in mature crops.—Agricultural Experiment Station, Moscow, Idaho.

2700. VOLK, G. M.
Factors determining efficiency of cyanamid and uramon for weed control in tobacco plantbeds.
Soil Sci., 1950, **69**: 377-90, bibl. 10.

Repeated use of ½ lb. or more of cyanamide per square yard in weed control treatment for tobacco plantbeds on light sandy acid soils resulted in residual pH values of 7·8 to 8·0. A pound of uramon alone increased the pH sufficiently above the threshold value of 7·7 to inhibit rapid nitrate-nitrogen production but permitted formation and accumulation of nitrite nitrogen. Uramon at 1 lb. plus ½ lb. of calcic lime permitted accumulation of 21 p.p.m. of nitrite nitrogen 35 days after treatment. When cyanamide was added to the uramon, formation of nitrites was inhibited and ammonia and pH remained high for at least 74 days. Cyanamide, upon absorption, was immediately effective in killing certain seeds, but uramon apparently was ineffective until a significant amount had been converted to ammonia, a process apparently requiring more than 2 but less than 5 days at autumn soil temperatures. Soil temperature was found to have a marked effect on the rate of decomposition of urea; the higher the temperature, the greater the rate of ammonification. [From author's summary.]

Weed control in fruit crops.

(*See also* 3122, 3141, 3425.)

2701. JOHNSON, E.
Herbicides in orchards.
Calif. Citrogr., 1950, **35**: 319, 346-7.

A general account is given of the types of herbicide available and the principles which should govern their use in Californian citrus and deciduous orchards. Particular attention is paid to oils, but mention is also made of the use of 2,4-D and other herbicides. The major weeds and their responses to treatment are discussed briefly.

2702. MOORE, P. W.
Weed control practices in California orchards.
Calif. Citrogr., 1950, **35**: 322.

The following aspects of weed control are discussed by a citrus grower: timing, spacing of irrigation furrows, oils used, spraying equipment, and costs.

2703. SPANGELO, L. P.
Chemical weeding of strawberry and raspberry plantings.
Proc. 3rd Mtg East. Sect. nat. Weed Cttee, Ottawa, 1950, pp. 67-9, bibl. 1.

The effects of 2,4-D on a strawberry plantation are described. Twelve strawberry varieties were tested with various formulations of 2,4-D at varied doses, applied when 10% of flowers were open in 1948 and just before the first flowers opened in 1949. Moderate distortions were observed on the plants, but most of them outgrew the effect of 2,4-D; varietal differences were evident. There appeared to be no differences in yield attributable to treatment. In the early part of the season, the broad-leaved weeds, among which red root pigweed, wild mustard, lamb's quarters and

dandelion predominated, were well controlled, but where straw mulch is used, hand eradication of the corn plants arising from it is necessary. Applications of sodium trichloroacetate in a raspberry plantation, while controlling broad-leaved weeds and severely stunting grasses, caused chlorosis and stunting of young raspberry shoots. No yield data are available.—Central Experimental Farm, Ottawa.

Weed control in tropical crops.

2704. McMartin, A.
Chemical weed killers. Their possible use in Natal cane fields.
S. Afr. Sugar J., 1949, **33**: 385-9.

The use of 2,4-D and methoxone (sodium 4-chloro-2-methyl phenoxyacetate) in cane fields is discussed, and the relative sensitivity of a number of weeds sprayed at the Experiment Station, Mount Edgecombe, is indicated. Sprays, especially the amine form of 2,4-D, have proved more effective than dusts, and for the more easily killed weeds the suggested dose is 1 lb. per acre of the active ingredient. The problem of resistant weeds, especially grasses, remains unsolved, but a possible solution may lie in combining contact sprays with the selective herbicides.

2705. Hall, H. H.
Spraying weeds with straight CADE.
Hawaii. Plant. Rec., 1950, **53**: 199-204, illus.

Undiluted CADE instead of the formerly recommended dilution of 1 in 8 has been used successfully on one sugar estate to destroy weeds in the two-leaf stage. Only about 21 gal. are used per acre and one man can spray 2½ to 3 acres a day at a total cost of $5.48 per acre, a saving of $3.00 over the old method. The knapsack and narrow 2-nozzle rod used are illustrated.

2706. Maier, E. A.
Current Louisiana field practices: plantation built sprayer: soybean planter.
Sugar J., 1950, **12**: 12: 17, 30-1, illus.

The sprayer was designed at Greenwood Plantation, Lafourche Parish, to apply chemicals used for the control of Johnson grass. Mounted like a tractor trailer it has a capacity of 475 gal. and a working pressure of 100 lb.

Weed control among trees and shrubs.

(*See also* 3190.)

2707. Edwards, M. V., and Holmes, G. D.
Selective weed-killers in conifer seedbeds.
Rep. For. Res. for year ending March 1949, 1950, p. 40, H.M. Stationery Office, Lond., 1s. 9d.

In spraying trials with 11 herbicides the following were selected as relatively harmless to the growth of Douglas fir, Japanese larch and Corsican pine: Ethyl phenyl carbamate at 0·5%, sodium methyl chlor-phenoxyacetic acid and two aromatic petroleum products.

Control of undesirable trees and shrubs.

2708. Day, M. W.
How to control undesirable trees and shrubs.
Quart. Bull. Mich. agric. Exp. Stat., 1950, **32**: 486-91, bibl. 4.

The most extensively used chemicals to control woody vegetation are 2,4-D, 2,4,5-T, singly or in combination, and ammate, all applied as sprays to foliage, cut stumps and dormant plants. A fourth method of chemical control is the poisoning of standing trees with ammate or sodium arsenate.—Dunbar Forest Experiment Station.

2709. Daniel, H. A., Elwell, H. M., and Cox, M. B.
Information for visitors at the Red Plains Conservation Experiment Station, Guthrie, Oklahoma and the Wheatland Conservation Experiment Station, Cherokee, Oklahoma.
Exp. Stat. Circ. Okla agric. Exp. Stat. **C-129**, 1948, pp. 30, bibl. 16, illus. [received 1950].

Although primarily concerned with methods of controlling soil erosion, a section (pp. 20-4) is devoted to methods of removing scrubby and woody vegetation mechanically and by chemicals. Machines, illustrated by photographs, are a mower equipped with stub guards and extra hold-down clips capable of cutting stems up to 1½ in. thick during the growing season; a brush beater for use on small shrubs and weeds on land where mowers cannot be used; a giant stalk cutter for breaking down shrubs, etc., killed with chemicals; a tractor-mounted and a small portable power saw for felling trees; and a small tractor-mounted buck rake for clearing and heaping brushwood and small trees. The varying responses of shrubs and trees to 2,4-D are noted. All these plants reacted to the non-selective herbicide Ammate although two or three applications were needed in some cases, and native grasses suffered badly. From trials in 1947 it would appear that mixtures of 2,4-D and diesel oil or 2,4-D and ammate in water are more effective than either chemical used alone. [Reference given: Elwell, H. M. Progress report of chemicals for brush control. *Mim. Circ. Okla agric. Exp. Stat.* M-172, 1948; see also abstract below.]

2710. Elwell, H. M., and Cox, M. B.
Brush control research at the Red Plains Conservation Experiment Station, Guthrie, Oklahoma.
Mim. Circ. Okla agric. Exp. Stat. **M.192**, 1950, pp. 7.

The work on clearing some of the 10 million acres of scrubby bush is being conducted by the Experiment Station in co-operation with the Research Division, Soil Conservation Service, U.S. Department of Agriculture. Machines tried successfully at the Red Plains station for removing it include brush mowers, saws, beaters, crushers and buck rakes. Their action is briefly described. Better machinery is needed for the application of herbicides, which are 2,4-D (dichlorophenoxyacetic acid) and 2,4,5-T (trichlorophenoxyacetic acid) in different forms and ammate (ammonium sulphamate). A satisfactory stage at which to apply 2,4-D is just after the shrubs have attained full leaf size. A control of 85 to 95% was achieved with 2,4-D ester spray against sumac, sand plum, black and honey locusts, western crab apple and sassafras. Other species were more resistant. With a mixed population of plants a mixture of 2,4-D and 2,4,5-T gave encouraging results. In summer one of the substances

mentioned above or sodium arsenite was placed in axe incisions encircling the trees near the ground. In winter oaks were sprayed with mixtures of 2,4-D and 2,4,5-T in diesel oil on the lower part of the trunk. The best results came from a stock solution containing 2 lb. of acid, two-thirds of it 2,4-D and one-third 2,4,5-T, diluted to 10 gallons; 90% of the oaks were killed by this in 1949. Dead brush thus treated was crushed with a heavy stalk-cutter implement 2 to 3 years afterwards and left on the ground. Stumps of oaks were painted in January and March, 1949, with 2,4-D and 2,4,5-T alone and with mixtures diluted in diesel oil. Ammate powder and sodium arsenite were also used. Only moderate reduction in sprout growth resulted.

2711. YOUNG, V. A., AND OTHERS.
Recent developments in the chemical control of brush on Texas ranges.
Bull. Texas agric. Exp. Stat. **721,** 1950, pp. 18.

Dealing with the eradication of woody plants, chiefly by 2,4-D and 2,4,5-T.

Noted.

2712.

a CLYDESDALE, C. S., AND HART, J.
Chemical weed control in grain crops.
Qd agric. J., 1950, **70**: 125-44, illus.
Descriptions of apparatus included.

b FRANKTON, C., AND BRAGG, K. K.
1950 list of herbicidal products submitted for registration [in Canada] as of April 30, 1950.
[*Publ.*] *Dep. Agric., Div. Bot. Plant Path., Sci. Serv., Ottawa*, 1950, pp. 15.

c MINISTRY OF AGRICULTURE, LONDON.
Destruction of yellow charlock.
Adv. Leafl. N.A.A.S. Lond. **2,** 1950, pp. 5, 1d.

VEGETABLES AND MISCELLANEOUS TEMPERATE CROPS.

Garden vegetables, general.

(*See also* 2548, 2576, 2634, 2644, 2648, 2992, 3382-3384, 3393, 3410, 3411, 3417, 3422, 3426, 3427, 3430, 3431, 3439, 3440.)

2713. BRÜHLMANN, J.
Erwerbseinkommen und investiertes Kapital im schweizerishen Gartenbau. **(Income and capital investment in Swiss market gardening.)**
Gärtnermeister, 1950, **53**: 253-5.
The article, an extract from the author's thesis, presents figures on the economic structure of Swiss horticulture. The capital invested in market gardens is estimated at 306 million francs.

2714. NATIONAL INSTITUTE OF AGRICULTURAL BOTANY.
Key to varieties of field and vegetable crops under trial, observation and propagation.
[*Publ.*] *N.I.A.B. Cambridge*, 1950, pp. 51.
This pamphlet contains a list of outstations at which N.I.A.B. trials are regularly conducted, a guide to the Headquarter Trial Grounds at Cambridge, tables summarizing varieties grown at outstations and other centres and indicating whether they are grown for trial, observation or demonstration, a key to varieties being grown at Hill Farm, Lolworth, for inclusion in 1950/51 trials, and a summary of seed multiplication crops and potato propagation. The horticultural crops include field beans, broccoli, brussels sprouts, cabbage, cauliflowers, onions, peas and oil poppies.

2715. BAIRD, W. P., AND DAHMUS, M. E.
Vegetable investigations under dry-land conditions at Mandan, N. Dak.
Circ. U.S. Dep. Agric. **831,** 1950, pp. 44, illus.
Variety tests and cultural experiments with vegetables under dry land conditions have been in progress since 1913 at the U.S. Northern Great Plains Field Station, N. Dakota. The rainfall here is very variable, the average annual precipitation from 1920 to 1945 being 15·44 in., half of this falling during the period May-July. Temperatures cover a wide range during the year and high winds occur in summer. In this circular the results obtained with 39 vegetable crops grown in the demonstration 1-acre garden over a period of 26 years are reported, and general recommendations are made for growing vegetables in the northern Great Plains.

2716. HARTMAIR, V.
Ergebnisse der Gemüsesortenversuche des Jahres 1949. **(Vegetable variety trials 1949.)**
Versuchsergebn. Bundesanst. alpine Landw. Admont, 1950, Hft **5**, pp. 30.
Preliminary trials with varieties of the more common vegetables were carried out at altitudes ranging from 640 m. to 1,920 m. to pave the way for economic vegetable growing in the mountains close to the local consumer and the holiday resorts. In these tests, results of which are tabulated, hardy and early maturing varieties are receiving first consideration.

2717. SCHWANITZ, F.
Gross-Samigkeit als Zuchtziel bei Gemüse mit kurzer Entwicklungsdauer. **(Large seeds as a breeding objective for quick maturing vegetables.)**
Züchter, 1950, **20**: 37-8, illus.
Larger yields were obtained in Germany in 1941 from garden cress and radishes with bigger seeds than from smaller ones. The size of the seed may thus influence the yield of quick maturing plants.—Baden Branch of the Kaiser-Wilhelm Inst. f. Züchtungsforschung, Rosenhof bei Ladenburg a.N.

2718. NAJJAR, H.
Vegetable seed selection. [Arabic, English summary 9 lines.]
Circ. Ext. Serv. Minist. Agric. Damascus **40,** 1949, pp. 8.
The introduction to Syria of new vegetable varieties, particularly cucumbers, is recommended to replace local unimproved or degenerated strains.

2719. Gould, C. J.
Vegetable seed-treatment in western Washington.
Bull. Wash. St. agric. Exp. Stats, **510**, 1949, pp. 45.
Experiment results of seed treatment with various preparations are given for beans, beets, cabbage, carrots, cauliflower, celery, chard (Swiss), corn (maize), cucumbers, kale, lettuce, lima beans, onions, peas, radishes, spinach, squash, tomatoes, and turnips. The active ingredients of the proprietary preparations mentioned are given.

2720. Ferguson, W.
A comparison between pelleted and unpelleted vegetable seed.
Reprinted from *Agric. Inst. Rev.*, May 1950, p. 1, being *Contr. Div. Hort., Exp. Farms Serv. Ottawa* **718.**
Trials with pelleted vegetable seed, including carrot, radish, cucumber, spinach and lettuce, were carried out at 9 experimental stations in Canada. The results show that neither the small quantity of nutrients contained in the inert material nor its fungicidal value benefit germination or performance. In general, the advantage gained in the case of sowing and spacing pelleted seed seems to be offset by increased weight and volume resulting in higher seed cost.

2721. Grainger, J.
Through plant pathology to correct nutrition.
Gr. Digest, 1949, **1**: 3: 14-20, reprinted as [*Publ.*] *Dep. Plant Path. W. Scot. agric. Coll., Auchincruive.*
An interesting progress review is given of studies on the nutrition of tomatoes and lettuce. A possible line of approach was indicated in 1945 during an examination of a commercial glasshouse lettuce crop that was completely ruined by browning of the leaves. Leaching and liming experiments on the original soil showed that over-manuring and extreme acidity were jointly responsible for the trouble. Subsequently, in Mitscherlich pot experiments, fertilizer containing 1 part sulphate of ammonia, 2 parts superphosphate and 1 part sulphate of potash was applied to lettuce at rates equivalent to ½, 1, 2, 4, 8 and 16 tons per acre; wilting of the leaf tips occurred at rates of 4 tons and over. A simple apparatus [not described here] was developed for estimating the limit of soluble mineral matter which would cause damage to lettuce.
In trials on tomatoes grown in soil with almost enough soluble mineral matter to damage lettuce and with different amounts of fertilizer added, the plants showed no actual damage, but gave yields that were inversely proportional to the amounts of added fertilizer. This response was re-examined in the light of Owen's work [noted in *H.A.*, 19: 1291] which indicated the needs of the tomato for large amounts of K but only for low quantities of P. It was found that, whereas yield declines with grossly unbalanced fertilizers when surplus soluble mineral matter begins to accumulate in the soil, much larger amounts can be applied without damage if the fertilizer approximates more nearly to the needs of the crop. There is, of course, a limit, but it has not been reached with even 4 tons per acre of moderately balanced fertilizer.

2722. Muzyčkin, E. T.
Manuring in vegetable/grass rotation in western Siberia. [Russian.]
Sad i Ogorod (Orchard and garden), 1954, No. 4, pp. 52-6.
From results of trials and soil analyses it was concluded that, on slightly leached black soils of western Siberia, long-term grass leys in vegetable rotations were a good means of maintaining the soil structure, and increasing organic matter, nitrogen and humus. Vegetables mentioned are cucumber, tomatoes, cabbage, carrots and potatoes.

2723. Bykovskiĭ, V. Ja.
The effectiveness of grassland agriculture in Siberian vegetable culture. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 5, pp. 31-5.
At the west Siberian vegetable experiment station in the Altai region the following rotation is used to provide optimum yields of vegetables under given conditions: (1) grass ley 1 or 2 years, (2) cucumbers and tomatoes with the addition of 40 tons of manure per hectare, (3) cabbages—90 kg. N, 120 kg. P, 120 kg. K, (4) root vegetables [carrots, beetroot], (5) potatoes—40 tons of organic manure. The climate of this region being continental with hard frosts, cold winds and snow, protective woodland strips are advisable.

2724. Thompson, A. C.
Fertilizer placement for vegetable crops.
Bett. Crops, 1950, **34**: 2: 6-10, 40-2, illus.
Fertilizer requirements of vegetable varieties are listed; application in irrigation water and by other methods is described.

2725. Barbier, G., Trocmé, S., and Chabannes, J.
Nouvelles recherches sur la chlorose des cultures en terrain d'épandage. **(New observations on chlorosis of plants grown on sewage farms.)**
C.R. Acad. Agric. Fr., 1950, **36**: 179-81.
Chlorosis in peas, potatoes, haricot beans, leek and spinach on sewage farms is attributed to manganese deficiency; the disorder was controlled by spraying the crops with manganese sulphate at 10-25 kilos per hectare.

2726. Brill, G. D., and Neal, O. R.
Seasonal occurrence of runoff and erosion from a sandy soil in vegetable production.
Agron. J., 1950, **42**: 192-5, bibl. 11.
In Central New Jersey the critical period of erosion hazard is during the summer and early autumn, with a peak in July. The canopy provided by vegetable crops is effective in reducing this hazard; additional winter cover cropping increases protectiveness. [From authors' summary.]

2727. Drouineau, G., Gouny, P., and Mazoyer, R.
Sur l'influence du calcaire sur la nutrition végétale. **(The effect of calcium on plant nutrition.)**
Ann. agron., 1950, **1**: 368-81, bibl. 22.
The effect of increased applications of calcium carbonate on potassium uptake was studied in maize, peas

and dolichos grown in sand culture. Neither the concentration of Ca ions nor any of the other variable factors introduced were found to affect the potassium content of the above-ground parts. This was determined only by the potassium concentration in the nutrient solution.—Station d'Agronomie et de Biochimie végétale, Antibes.

2728. Hopkins, H. T., Specht, A. W., and Hendricks, S. B.
Growth and nutrient accumulation as controlled by oxygen supply to plant roots.
Plant Physiol., 1950, **25**: 193-209, bibl. 26, illus.

Growth response, nutrient accumulation, and nutrient transport were measured for tomato (var. Marglobe), soybean (var. Biloxi) and tobacco (var. Maryland Mammoth and Connecticut broadleaf) in their dependence on oxygen supply in the root zones. Root growth of all plants was stopped at an oxygen content of 0·5% in the gas around the roots. Top growth and ion accumulation continued at this level. In tomato, response was proportional to log. pO_2 from 0·5% to 21% oxygen for growth and ion accumulation. The log (transport rate) was a function of time independent of oxygen supply to the roots. This indicates that rate of transfer from the root to the shoot is independent of aerobic mechanisms in the roots. Accumulation of major nutrient elements with the exception of Mg for tomato parallels top growth in dependence upon oxygen supply to roots. Minor nutrient elements with the exception of Mn and Fe for tomato remain constant or increase with lowered oxygen levels. The increase of sodium is most striking. [Authors' summary.]—Plant Industry Station, Beltsville, Md.

2729. Davis, J. F., French, G. W., and Eldredge, D. B.
Self-propelled fertilizer side-dresser.
Quart. Bull. Mich. agric. Exp. Stat., 1950, **32**: 540-2, illus.

A fertilizer drill was designed at the Michigan Agricultural Experiment Station to deliver side-dressings. It consists of a rotating, top-delivery cylinder hopper, mounted on the front of a garden tractor, and is briefly described with the aid of photographs. It was satisfactorily used in corn, mint, onions and celery.

2730. Šeremetevskiĭ, P.
Hotbed and greenhouse management. [Russian.]
Kolhoz. Proizv. (Collective farming), 1949, No. 12, pp. 34-6, illus.

An account is given of the methods adopted in the U.S.S.R. for utilizing hotbeds, greenhouses, warm soil and open nursery ground for supplying residential and industrial towns with fresh early vegetables in winter and spring. Mention is made of cabbage, eggplant, cucumber, tomato, pepper, celery, pumpkin, vegetable marrow, leek, radish, lettuce, spinach, and dill.

2731. Carolus, R. L., and Schleusener, P. E.
Effect of irrigation on the yield of snap beans, sweet corn and tomatoes as influenced by certain cultural practices in 1949.
Quart. Bull. Mich. agric. Exp. Stat., 1950, **32**: 465-78, bibl. 2.

Results of irrigation practices in Michigan for 1949, with seasonal rainfall 134% of average, were compared with 1948 results [see *H.A.*, 19: 2095]. In 1949 the increase in yield due to irrigation on the same crops [sweet corn and snap beans] was not significant, ranging from 6 to 12%. When, however, the most productive irrigation practice was combined with higher than normal fertilizer application, the crop increases ranged from 10 to 20%. Experiments with starter-solution-treated tomato transplants indicated that the treatment was significantly effective in improving early but not total yield. While approximately 4 inches of irrigation are adequate and productive of yield increases during seasons in which the rainfall varies up to 25% in either direction from normal, when the rainfall is considerably above average, e.g. 34% in 1949, increased fertilizer applications are advisable. [From authors' summary.]

2732. Grainger, J.
Crops and diseases. I. A digest of results of the disease phenology plots maintained and recorded by the Department of Plant Pathology, West of Scotland Agricultural College, Auchincruive, Ayr. 1945-49.
Res. Bull. Dep. Plant Path., W. Scot. agric. Coll. **9**, 1950 [?], pp. 51.

Observations recorded are mostly for grain crops, but potatoes, beans and turnips are included.

2733. Coleman, L. C.
Tumor induction in *Vicia faba* and other hosts by *Agrobacterium rubi* (Hildebrand) Starr and Weiss.
Canad. J. Res., Sect. C, 1950, **28**: 277-82, bibl. 14.

Agrobacterium rubi, isolated from Himalaya blackberry, produced large tumours in *Vicia faba*, while inoculations of this plant with *A. tumefaciens* proved unsuccessful. Sunflower was a common host to both pathogens, but tomato and some other plants highly susceptible to crown gall did not respond to *A. rubi*. It is thought that this species as well as *A. tumefaciens* will provide interesting material for the study of plant tumours.

2734. McKeen, C. D.
Arasan as a seed and soil treatment for the control of damping-off in certain vegetables.
Sci. Agric., 1950, **30**: 261-70, bibl. 7, illus.

A comparative study of the effectiveness of seed treatment, of soil treatment, and of combined seed and soil treatment with Arasan and certain other chemicals was conducted in an effort to control damping-off of peppers, tomatoes, spinach, Spanish onions, cucumbers, muskmelons, lettuce and celery. With the possible exception of lettuce and celery in all treatments, and in soil treatment of muskmelons, Arasan proved effective.—Dominion Laboratory of Plant Pathology, Harrow, Ontario.

2735. Snyder, W. C., Hansen, H. N., and Wilhelm, S.
New hosts of *Verticillium albo-atrum*.
Plant Dis. Reptr, 1950, **34**: 26-7, bibl. 6.

Plants from which the authors have isolated *Verticillium albo-atrum* are mentioned. This appears to be the first report of Verticillium wilt for cabbage, brussels

sprouts, radish, heather, Transvaal daisy and pistachio, the first report in the United States for olive and the nightshade weed, and the first report in California for the Crandall blackberry. It caused extensive losses in fields of brussels sprouts in 1949, affected plants being stunted with pronounced interveinal yellowing particularly of the lower leaves. Young olive orchards, particularly those planted on land previously cropped to tomato, were often severely injured, and commercial plantings of heather suffered heavy losses.

2736. PEPPER, B. B., AND STARNES, O.
Vegetable insects and their control on commercial plantings.
Bull. N.J. agric. Exp. Stat. **750,** 1950, pp. 16.
This bulletin discusses sprays and dusts, new insecticides, insecticide formulae, mixing dusts on the farm, and concludes with an insect control chart.

2737. PEPPER, J. O.
Insects attacking vegetables and their control.
Circ. Pa agric. Ext. Serv. **360,** 1950, pp. 26, illus.
After a brief discussion on insecticides used on vegetables there is a table of spray and dust dilutions and a note on spraying and dusting equipment. The circular then describes the insect pests, with control measures, of twenty vegetables, including eggplant, melon, pepper, squash and tomato.

2738. MITCHENER, A. V.
Garden insects and their control.
Publ. Man. Dep. Agric. **232,** 1950, folder.
The chief insects of garden produce in Manitoba are described and control measures with formulae given for the preparation of poisoned bait, DDT spray and nicotine sulphate spray and dust. The reverse side is a control programme, showing the insects, plants attacked, descriptions of injuries, life histories, time for effective control and the preparations for control.

2739. EICHLER, W.
Auffällige Schädlingsvorkommen in Mitteldeutschland (1948). **(Noteworthy cases of pest incidence in central Germany in 1948.)**
NachrBl. dtsch. PflSchDienst Berlin, 1949, **3**: 168-72.
Notes on the following pests are included: *Sitona* spp. on peas and beans, *Otiorrhynchus ligustici* on a variety of horticultural crops, including small fruit, *Otiorrhynchus fullo* on apple, *Lixus iridis* on lovage, white grub in lettuce, *Podagaria malvae* on broad beans and spinach, *Barathra brassicae* on tobacco, *Malacosoma neustria* and *Cydia nigricana* on peas, *Mesocerus marginatus* on rhubarb.

2740. MAYEUX, H. S., WENE, G. P., AND GODFREY, G. H.
Insects and disease control for vegetable crops in the Lower Rio Grande Valley (1949-50).
Proc. 4th Annual Rio Grande Valley hort. Inst., 1950, pp. 107-20.
Concise recommendations are made for the chemical control of insects and diseases attacking the following vegetables in the Lower Rio Grande Valley: Beans, beets, broccoli, cabbage, cantaloupes, carrots, cauliflower, celery, cucumbers, egg plants, lettuce, mustard, okra, onions, peppers, potatoes, peas, radishes, spinach, squash, sweet corn and tomatoes.

2741. MATTHEWMAN, W. G.
Aphids.
Processed Publ. Ser., Ent., Dep. Agric. Ottawa **82,** 1948, pp. 8 [received 1950].
Control measures are recommended against 6 aphid species injurious to vegetable crops in Canada.

2742. WENE, G. P.
Control of vegetable aphids in the Lower Rio Grande Valley.
Proc. 4th Annual Rio Grande Valley hort. Inst., 1950, pp. 100-6, bibl. 9.
A 1% tetraethyl pyrophosphate dust was superior to both a 3% benzene hexachloride dust and tetraethyl pyrophosphate spray as a control for the cabbage aphid. A 0·5% parathion dust, a 1% lindane dust and a 3% nicotine dust gave good control of the cowpea aphid immediately after application, but the data indicated that the parathion dust had the best residual effect. In small plot work, 0·25 and 0·5% parathion and 1% lindane dusts were effective in controlling the melon aphid on squash. Both hexaethyl tetraphosphate and parathion sprays were effective in controlling the pea aphid. The red lettuce aphid was effectively controlled with hexaethyl tetraphosphate applied at the rate of 1·5 pints per acre by airplane. 1% concentrations of rotenone, parathion, and gamma benzene hexachloride were effective in controlling the turnip aphid. Since the organic phosphates, parathion, hexaethyl tetraphosphate, and tetraethyl pyrophosphate are very toxic to warm-blooded animals the Texas Agricultural Experiment Station is not recommending these materials for use in controlling aphids until more is known about the dangers inherent in using such materials. [Author's summary.]

2743. STEUDEL, W.
Über die Bedeutung einiger winterfester Gemüsesamenkulturen als Winterwirte der grünen Pfirsichblattlaus (*Myzodes persicae* Sulz) in der Kölner Bucht. (Vorläufige Mitteilung.) **(The importance of some hardy seed vegetables as winter hosts of the peach aphid in the Cologne area. Preliminary communication.)**
NachrBl. dtsch. PflSchDienst. Braunschweig, 1950, **2**: 70-4, bibl. 5.
During the mild winters 1947/48 and 1948/49 in the Cologne district of Germany, *Myzodes persicae* overwintered in the open on savoy, autumn-sown spinach, brussels sprouts and kale. Following development on plants throughout the winter, and under favourable conditions, winged forms appeared in April. Sugar beet and mangolds in the vicinity suffered heavily from virus yellows in the summers following.

2744. SWANK, G. R., AND LATTA, R.
Vacuum fumigation with methyl bromide to kill larvae of white-fringed beetles.
J. econ. Ent., 1950, **43**: 25-9.
Larvae of white-fringed beetles, *Graphognathus* spp., were fumigated with methyl bromide in balled and burlapped nursery soil masses from 3 to 42 inches in diameter. The fumigation was for 90 minutes in a sustained vacuum of at least 24·5 inches of mercury.

The tests were made in 5 different parts of the U.S. A graduated dosage schedule was developed, from 6 lb. per 1,000 cu. ft. at 40° F. to 2 lb. at 80° F., decreasing proportionately with change of temperature. Larvae of 6 strains responded in essentially the same manner to the dosage schedules, no appreciable difference in mortality being observed due to soil types. Mortality was reduced when the soil moisture approached saturation or dropped below the wilting point of growing plants. [From authors' summary.]

2745. TROUILLON, L.
Détruisez les courtilières. **(Control of mole crickets.)**
Progr. agric. vitic., 1950, **67**: 136-7.
The use of 10% HCH (hexachlorocyclohexane) at 4 kg. to 50 kg. crushed maize, wheat or rice moistened till friable is recommended as a bait scattered in market gardens. A second application should be made 15 days later.

2746. MÜLLER, F. P.
Erdraupenschäden durch *Agrotis* (*Feltia*) *ypsilon* Rott. (Noct.). **(Cutworm damage to cultivated plants.)**
NachrBl. dtsch. PflSchDienst Berlin, 1949, **3**: 10-13, bibl. 18.
Vegetables and some other crops grown in low-lying areas near the river Oder suffered very heavy cutworm damage in the summer of 1947. The connexion that exists between infestations of *Agrotis ypsilon* and flooding of the river is discussed.

2747. PALTI, J.
Root diseases and nematodes on field and garden crops in Palestine.
[*Publ.*] *Veg. Gr. Ass. Israel*, 1948, pp. 8 [received 1950].
This is a summary of a Hebrew booklet of 87 pages which is based on the ecological studies and records of root diseases occurring in Palestine made by Dr. I. Reichert and his staff at the Division of Plant Pathology during the past 25 years, and it includes notes on field observations made by the author.

2748. MINISTRY OF AGRICULTURE, LONDON.
Wireworms.
Adv. Leafl. N.A.A.S. Lond. **199**, 1950, pp. 6, illus.
Wireworms, the larvae of click-beetles, are briefly described with notes on the damage they cause and their control by cultivation. Potatoes and tomatoes are mentioned among the crops susceptible to serious damage. Peas and beans are relatively resistant and are normally good crops for infested land.

2749. LANGE, W. H., Jr., LEACH, L. D., AND CARLSON, E. C.
Lindane for wireworm control.
Calif. Agric., 1950, **4**: 1: 5-6, from abstr. in *Soils and Ferts*, 1950, **13**: 1092.
Treatment of seeds of field crops and vegetables with lindane, the pure γ-isomer of benzene hexachloride, renders the area sown toxic to wireworms. Effective dosage rates which are harmless to the seed are given for various crops. Fungicides can be applied with lindane. Lindane confers partial protection against attack by the seed corn maggot.

2750. LANGE, W. H., Jr., CARLSON, E. C., AND LEACH, L. D.
Seed treatments for wireworm control with particular reference to the use of lindane.
J. econ. Ent., 1949, **42**: 942-55, bibl. 13.
Lima and other beans, peas, cucumber, cantaloupe and tomato seed were treated in laboratory and field tests in California. Of the chemicals tested—namely parathion, lindane, technical benzene hexachloride, aldrin, dieldrin, DDT and chlordan—the purified gamma isomer of benzene hexachloride (=lindane) applied in liquid form was the most promising. The tolerance of different seeds to lindane varied markedly; injury may be caused by overstepping the suggested dosage. Field observations indicated that not all wireworms are equally affected by lindane; most susceptible was an *Oelus* sp., followed by *Limonius canus*, *L. californicus* and *Anchastus* sp. Combination insecticide-fungicide treatments were found possible. [From authors' summary.]

2751. GINSBURG, J. M., FILMER, R. S., AND REED, J. P.
Longevity of parathion, DDT and dichlorodiphenyl dichloroethane residues on field and vegetable crops.
J. econ. Ent., 1950, **43**: 90-4, bibl. 14.
Residues of parathion, DDT and dichlorodiphenyl dichloroethane, applied as dusts and sprays, were analysed on onions, scallions, peas and some field crops, and translocation analyses were made on shelled peas, potato tubers and some field crops. Results are tabulated. Virtually no parathion residues were recovered on crops harvested 12 or more days after the last application of 0·5% to 1% dusts or sprays containing 0·125 to 0·25 lb. per acre. Peas, however, sprayed with 0·5 lb. parathion per acre showed 0·1 p.p.m. of toxicant 19 days after spraying. None of the 3 insecticides was found translocated in any appreciable quantity in plant tissues.—New Jersey Agricultural Experiment Station.

2752. PRIMOST, E.
Weitere Untersuchungen über den Einfluss von DDT auf Wurzelentwicklung, Keimfähigkeit und Triebkraft einiger Kulturpflanzen. **(Further research on the influence of DDT on root development, germination and growth capacity of some cultivated plants.)**
[English summary ½ p.]
PflSch. Ber. Wien, 1950, **4**: 150-64, bibl. 9, illus.
Growth of kohl rabi and rape was not inhibited when DDT of 0·02 and 0·05% concentration was mixed with the soil. The germination of tomato seeds in water with admixture of DDT was retarded, that of rape seeds was normal. The differing reactions of the plants and seeds examined [see also *H.A.*, 19: 2105] to soil and seed treatment with DDT indicate a selective action of this insecticide. [From author's summary.]—Hochschule f. Bodenkultur, Vienna.

2753. SMITH, F. F.
U.S.D.A. tests show new aerosol development improves control of greenhouse insects.
Flor. Exch., 1950, **115**: 2: 14, 19, bibl. 4.
Tetraethyl dithiopyrophosphate in aerosols is highly toxic to spider mites, aphids, whiteflies and mealybugs

and relatively low in phytotoxicity, according to experiments conducted at Beltsville, Md, and in commercial greenhouses during the past 2 years. In comparison with parathion, hexaethyl tetraphosphate and tetraethyl pyrophosphate, tetraethyl dithiopyrophosphate was more effective in destruction of larvae and adults of the resistant strain of two-spotted spider mite (*Tetranychus bimaculatus*). Five applications of 5% aerosol (Formula A-178) at 3-day intervals with exposures of 2 hours or overnight at 80° F., reduced heavy infestation to a few scattered individuals. Many plants were treated from 1 to 8 times with tetraethyl dithiopyrophosphate in 5% aerosols at the rate of 1 lb. per 50,000 cu. ft. without causing injury except to tips of roses, which may have been due to the high, 90° F., temperature. In other experiments, applications of 4 and 8 lb. per 50,000 cu. ft. were made to a limited number of plants, without injury. Detailed instructions on the use of this preparation are given.

2754. Garman, P.
Parathion resistant red spiders.
J. econ. Ent., 1950, **43**: 53-6, bibl. 1.
From investigations carried out at the Connecticut Agricultural Experiment Station, the author draws the following conclusions: " 1. The greenhouse red spider may become resistant to chemicals such as parathion, but this resistance is not necessarily carried over to chemicals in the same group. 2. Mites from beans treated with molybdenum showed little resistance to various chemicals such as parathion. In the case of selenium, populations on beans receiving equal molybdenum and selenium were intermediate between checks and those with selenium alone. 3. Practical range control of resistant strains appears possible using aerosols of either tetraethyl dithiopyrophosphate or parachloro phenyl *p*-chlorobenzene sulphonate."

Garden vegetables, particular.

(*See also* 2198, 2259, 2261, 2280, 2536, 3377, 3381, 3390g.)

2755. Anon.
De aspergeroest. **(Asparagus rust.)**
Vlugschr. PlZiekt. Dienst **67**, 1950, pp. 3, illus.
Notes on the symptoms and control of asparagus rust, *Puccinia asparagi* D.C. The asparagus variety Mary Washington is mentioned as being infected later in the season and to a less degree than some other varieties such as Roem van Brunswijk.

2756. Zaumeyer, W. J.
Topcrop tops in snap bean yields.
Market Gr. J., 1950, **79**: 4: 7, 40-1.
This new variety, stated to be resistant to the common and to the New York 15 mosaic, has been tested in many parts of the U.S.A. for market, canning and freezing qualities.

2757. Somos, A.
Ujabb adatok sárgahüvelyü bokorbabfajták ismeretéhez. **(Yellow dwarf beans.)** [German summary ½ p.]
Bull. Fac. Hort. Buda., 1949, **13**: 137-52, bibl. 2.
Observations made in Hungary on 5 varieties of yellow dwarf beans covered their growth, yield, percentage wastage of material in preparation for cooking, and suitability for drying. The growth period from sowing to ripening fluctuated between 78 and 88 days; 9 days were needed for germination, and the period from germination to flowering was about equal to that from flowering to ripening, with very little variation within the 5 varieties.

2758. Groszmann, H. M.
Winter injury to French beans.
Qd agric. J., 1950, **70**: 145-6, illus.
Two types of winter injury to French beans, evident in Queensland during July and August 1949, are described briefly. Curving and stunting of the pods with failure of the seeds to develop appeared to be due to temperatures too low to allow normal seed formation but not low enough to injure the plants. The appearance of dead, scorched areas on the leaves of other plants is thought to be due to prolonged exposure to cold winds, rather than to actual frost effect.

2759. Zaumeyer, W. J., and Thomas, H. R.
Bean diseases and their control.
Fmrs' Bull. U.S. Dep. Agric. **1692**, 1949, pp. 38, illus.
The bulletin describes control practices, diseases of snap beans and dry beans, lima beans and beans in transit and storage. It names recommended bean varieties that have proved immune to certain diseases.

2760. Cox, R. S.
Stem anthracnose of lima beans.
Tech. Bull. N.C. agric. Exp. Stat. **90**, 1950, pp. 28, bibl. 32, illus.
Stem anthracnose (*Colletotrichum truncatum*), a foliage and pod disease of lima bean (*Phaseolus lunatus*) in North Carolina, is serious in home gardens and in commercial plantings. The fungus, its host range, disease symptoms and control trials are described. Promising control measures include (*a*) the use of disease-free seed, (*b*) ploughing under lima bean refuse in autumn, and (*c*) weekly applications of Dithane Z-78 or Phygon sprays.

2761. El-Helaly, A. F.
Bordeaux mixture for the prevention of rust and chocolate spot of beans.
Phytopathology, 1950, **40**: 699-701, bibl. 2.
Costed field trials in Lower and Middle Egypt have shown that both rust and chocolate spot of beans can be controlled satisfactorily and economically by spraying with 0·25 bordeaux mixture. A small sprayer, such as a 1½ h.p. hydraulic motor pump sprayer, is recommended because it can be moved easily along drainage canals or narrow intervals left for the purpose. The labour gang per unit consisted of 5 men to do the spraying, 5 boys to carry the long main hose and 6 girls to carry water.

2762. Dana, B. F., and Vaughan, E. K.
Experiments in control of white mold of beans by fungicides applied as dusts and sprays.
Plant Dis. Reptr, 1950, **34**: 8-14.
Trials for the control of white mould of beans (*Sclerotinia sclerotiorum*) indicate that on the dusted plots Zerlate and Flotox reduced infections by comparison

with controls, and on sprayed plots Zerlate plus Sulforon was very much superior to the other fungicides used.

2763. SCHRÖDTER, H., AND STOLL, K.
Untersuchungen über das Mikroklima in Ackerbohnenbeständen verschiedener Bestandsdichte und seinen Einfluss auf den Sporenaustritt von *Ascochyta pinodella* Jones. (The influence of microclimate on the exudation of *Ascochyta pinodella* spores on broad beans planted at varying densities.)
NachrBl. dtsch. PflSchDienst Berlin, 1949, **3**: 88-96, 144-7, bibl. 15.

The effect of temperature and humidity on spore exudation of *Ascochyta pinodella* on broad beans was shown to increase with greater density of planting, the most favourable condition for the fungus being a uniform temperature at a high humidity. Higher and fluctuating temperatures require a larger number of " humid " hours for the exudation of spores to become possible. The experimental results suggest that the conditions for a serious outbreak of foot rot are generally fulfilled only in a maritime climate, a conclusion which agrees well with field observations.—Aschersleben Branch of the Biol. Zentralanstalt.

2764. BRANNON, L. W.
Tests of some new insecticides to control Mexican bean beetle.
J. econ. Ent., 1949, **42**: 928-30, bibl. 5.

In an experiment at Norfolk, Va, the following dust mixtures gave the most effective control of the Mexican bean beetle, *Epilachna varivestis* Muls., on snap beans. With a mixture containing 0·45% rotenone, 3% DDT and 50% sulphur at 32 lb. per acre, 3 applications achieved 98% control of larvae; with a mixture containing pyrethrum (0·08% pyrethrins), 0·5% piperonyl cyclonene and 25% sulphur at 23 lb., 4 applications gave 90% control; while 4 applications of 0·5% parathion at 20 lb. per acre gave 85% control.

2765. KENAGA, E. E., AND HUMMER, R. W.
The toxicity of some substituted phenyl benzenesulfonates to the two-spotted spider mite and Mexican bean beetle.
J. econ. Ent., 1949, **42**: 996-7, bibl. 5.

Twenty-two substituted phenyl benzenesulfonates were tested against the egg and adult life stages of the two-spotted spider mite, *Tetranychus bimaculatus*, and the larva of the Mexican bean beetle, *Epilachna varivestis*, at the Dow Chemical Co., Midland, Michigan. Results are tabulated and summarized.

2766. KENAGA, E. E.
The toxicity of some bis(substituted phenoxy) methanes to the two-spotted spider mite and Mexican bean beetle.
J. econ. Ent., 1949, **42**: 998, bibl. 4.

Twenty-four bis(phenoxy)methanes were tested against eggs and adults of the two-spotted spider mite and larvae of the Mexican bean beetle. The following relationship of chemical structure to insecticidal activity was observed: 1. Bis(4-chlorophenoxy)methane exhibits good toxicity against all like stages of the organisms tested and is particularly specific to mite eggs. Thus the bis 4-chloro-substitution seems to be most advantageous in this series of compounds. 2. Compounds containing the bis 2-allyl ring substitution either in combination with other ring substitutions or alone appear to impart to these compounds a high order of toxicity to the 2-spotted spider mite adult and to the Mexican bean beetle larva. [Author's summary.]

2767. KENAGA, E. E.
The toxicity of some substituted phenyl benzoates to the two-spotted spider mite and Mexican bean beetle.
J. econ. Ent., 1949, **42**: 999-1000, bibl. 3.

Twenty phenyl benzoates were tested against the egg and adult life stages of the two-spotted spider mite and the larva of the Mexican bean beetle. The following relationships of chemical structure to insecticidal activity were observed: 1. Optimum acaricidal activity occurred where one or more rings were substituted with chlorine in the para position. Ovicidal properties were greatest where both rings were substituted with chlorine in the para positions (4-chlorophenyl ester of 4-chlorobenzoic acid). 2. The phenyl benzoates investigated were not sufficiently toxic to the Mexican bean beetle larva to make possible a correlation of insecticidal activity and chemical structure. [Author's summary.]

2768. MOORE, D. H.
Piperonyl cyclonene, pyrethrins, and rotenone in dusts to control the Mexican bean beetle.
J. econ. Ent., 1950, **43**: 188-90, bibl. 3.

Summarized results of comparative tests in the control of Mexican bean beetle, *Epilachna varivestis* larvae and adults, with a dust containing 0·5% piperonyl cyclonene, 0·05% pyrethrins, and 0·25% rotenone, designated commercially as " CPR " dust, and with rotenone dust.

2769. KLINKOWSKI, M., AND EICHLER, W.
Das Auftreten der " Bohnenfliege ", *Hylemyia platura* Meigen (=*cilicrura* Rond.) in Mitteldeutschland im Jahre 1949. (Incidence of the bean seed fly in central Germany in 1949.)
NachrBl. dtsch. PflSchDienst Berlin, 1949, **3**: 81-8, bibl. 33.

A set of special conditions in the spring of 1949 combined to favour an unusually heavy infestation of the bean seed fly in central Germany, resulting in very serious damage to the crop. Extent and type of injury and the biology of the pest are discussed.

2770. HEWITT, E. J., AND JONES, E. W.
Molybdenum as a plant nutrient. II. Effect of molybdenum deficiency on some brassica crops.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 58-63, bibl. 15, illus.

1. The following *Brassica* crops were grown in molybdenum deficient sand culture: cauliflower, hungry gap kale, marrow stem kale, rape, savoy cabbage, brussels sprout, swede. 2. An improved technique for nutrient reagent purification, involving co-precipitation of molybdenum impurities with copper sulphide, was used. The purity of sand, water and reagents was checked by means of an *Aspergillus niger* bioassay technique. All crops showed severe molybdenum deficiency symptoms, especially in the seedling stage;

yields were reduced to 10% or less (except savoy) and mortality was high. 4. The general order of susceptibility to molybdenum deficiency, as judged visually and from yield and mortality data, was: swede, sprout, kale (hungry gap), cauliflower, rape, kale (marrow stem), savoy cabbage. 5. The ability of certain varieties to recover partially from the effects of molybdenum deficiency, and the similarity of later symptoms to the whiptail condition in cauliflower, are discussed in relation to the special effects noted in *Brassica* crops. [Authors' summary.] The visual symptoms observed on each of the plants used in the experiment are described. [For Part I, see *H.A.*, 19: 3080.]

2771. Chang, L.-T., and Li, C.-S.
A note on the FCU late cabbage. [Chinese, English summary ½ p.]
Fukien agric. J., 1949, **11**: 105-7, illus.
The FCU late cabbage originated from Sutton's Drumhead as a result of 15 years of continuous selection and acclimatization in Fukien. The cabbage is briefly described and illustrated.

2772. Morris, J. S.
Cabbage variety and fertility tests in the lower Rio Grande Valley.
Proc. 4th Annual Rio Grande Valley hort. Inst., 1950, pp. 33-9, bibl. 3.
In trials with 4 varieties in 4 areas and using 3 transplanting dates, Early Round Dutch proved superior in both yield and quality to Glory of Enkhuizen, Marion Market and Green Acre. Spacing in rows and between rows was 8 in. with the plants set alternately, and a high rate of fertilizer was used. This high plant density adversely affected the size of heads of all varieties despite the high fertility level. In an NPK fertilizer trial with Early Round Dutch on a fine sandy loam soil the main response was to N which materially increased size of heads. Both P and K appeared to produce further slight increases in yield.—Texas agric. Exp. Stat., Weslaco.

2773. Kraevoĭ, S. Ja.
Cabbage flowering in the first year of growth when grafted on spring rape. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1948, **60**: 909-12, bibl. 2 [received 1950].
Cabbage (*Brassica oleracea* var. *capitata*) grafted, in various stages of growth, on rape (*B. napus oleifera annua*) flowered and produced seed in the first year of growth in 24% of the plants. Ungrafted controls did not flower the first year.

2774. Dawson, C. D. R.
Stump saved cabbage seed helps to avoid bolters.
Grower, 1950, **33**: 1158-9, bibl. 2.
It is suggested that when cabbage plants reach a certain size or physiological age a cold spell may induce flower instead of leaf formation in the growing point. This hypothesis would account for the unusually large amount of bolting this year in early planted spring and summer cabbage following the sudden cold spell at the end of April. Bolting due to genetical differences could be overcome by cutting the crop in the usual way, roguing the crop for bolters at the same time. Side shoots develop from the stumps, and these will flower in the second season, making 3 years in all for the seed crop.

2775. Janes, B. E.
The effect of irrigation, nitrogen level and season on the composition of cabbage.
Plant Physiol., 1950, **25**: 441-52, bibl. 10.
Glory of Enkhuizen cabbage was grown at Gainesville, Florida, with four levels of water supply—frequent, occasional, medium irrigation and without supplemental water—two levels of nitrogen fertilization and in two different seasons. Samples of cabbage were analysed for dry weight, ascorbic acid, reducing sugars, acid hydrolysable carbohydrates, acid insoluble residue, ash, Ca, Mg, K, Na, P, N, S, Fe and Mn. There was no difference in growth or composition of cabbage harvested from the various irrigation treatments in January. Because of an extended period of dry weather during the growth of the cabbage harvested in April there was a marked response in growth of the crop on different plots. Associated with this difference in growth were the following differences in composition. On a fresh weight basis, all constituents estimated except Na were highest in the non-irrigated cabbages and lowest in the frequently irrigated cabbage. On a dry weight basis the reducing sugars decreased and acid hydrolysable carbohydrates and nitrogen increased with a decrease in the amount of water added. On a dry weight basis SO_4 and K were lower and Na was higher in the medium samples. The percentage of Fe and Mn increased with a decrease in irrigation. The main effect of side dressing with $NaNO_3$ was to increase the sodium content. The only difference between seasons was associated with difference in response to irrigation treatments. [From author's summary.]

2776. Kulikova, M. F.
An irrigation experiment on cabbage variety "Nomer pervyi" [Number one] in the Moscow region. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 5, pp. 36-8.
Overhead irrigation experiments, carried out in the 1948 and 1949 seasons at a vegetable research institute are described and results are tabulated. Considerably higher yields and earlier harvesting resulted from irrigation.

2777. Artemev, G. V.
"Growing through" of seed cabbages. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 5, pp. 39-42, illus.
One of the worst diseases of seed cabbages in central Kazahistan is the so-called "growing through" or "doubling" of seed heads. It usually appears about flower setting time. No normal flowers, and in consequence no pods, appear, the petals are green, stamens are deformed and stigmas are absent. The pistils divide into 2 leaves and grow through, forming a second and sometimes a third tier formation. The plant curls and spreads. Sometimes other abnormalities are noticeable. No fungal or bacterial cause was found, but the suggestion of the author, based on experiments at the Karagandinsk agricultural experimental station in 1944-47 that it is due to virus, is not wholly acceptable to the Russian editor.

2778. GEISLER, E.
Beitrag zur Problematik der Kohlherniebekämpfung. **(Clubroot control.)**
NachrBl. dtsch. PflSchDienst. Braunschweig, 1950, **2**: 122-4, bibl. 5.

In the Darmstadt area cabbage is grown intensively on two types of soil: on a nearly sterile sand irrigated with sewage water and on an almost black, marshy soil. The object of the experiment was to compare the clubroot control effected in these conditions by (*a*) quicklime and (*b*) two disinfectants, formaldehyde and Brassican. The disease was more difficult to suppress in marsh soil, water content and not soil reaction being the limiting factor. Liming proved more effective than the disinfectants, as the latter were subject to inactivation by absorption in the humic soil. The lack of soil colloids, on the other hand, caused leaching of the lime in sand, so that here formaldehyde and Brassican gave the better results.

2779. MCLEAN, D. M.
A progress report on the experimental application of dusts and sprays to cabbage seed plants for control of *Sclerotinia* stalk rot.
Plant Dis. Reptr, 1950, **34**: 78-9.

Results with 5 materials used as sprays against stalk rot (*Sclerotinia sclerotiorum*) showed the treated plots to have fewer infected plants than the controls, the order of effectiveness in descending order being Dithane Z-78, Zerlate, Fermate, Puratized, Kolofog. The figures for total centres of infection after dust treatment, with copper oxychloride, sulphate, Fermate, Kolodust, Zerlate and Dithane Z-78, were not consistent enough to indicate any trend toward control.—Washington State Agricultural Experiment Station.

2780. FREY, W.
Die Kohlrübenblattwespe (*Athalia colibri* Christ.). ***(Athalia colibri.)***
Flugbl. biol. Bundesanst. Braunschweig **H 13**, 1950, pp. 5, illus.

In south-eastern Germany, where the continental climate favours the pest, cabbage is one of the crops severely damaged by *Athalia colibri*. Control of the larvae with parathion preparations has given very good results, while BHC requires the application of heavy dosages and DDT is ineffective.

2781. MATTHEWMAN, W. G.
The cabbage maggot *(Hylemya brassicae).*
Processed Publ. Ser., Ent., Dep. Agric. Ottawa **90**, 1948, pp. 9.

Suggestions for control with corrosive sublimate, calomel-talc dust, calomel-cornstarch stem treatment, DDT (50% powder) stem treatment, benzene hexachloride dust, tar-paper discs.

2782. KLINKOWSKI, M.
Die Bekämpfung der Kohlfliege mit Hexamitteln. Ein Beitrag zur kombinierten Schädlingsbekämpfung im Kohlpflanzenbau. **(Cabbage root fly control with BHC preparations. A contribution to the application of insecticides controlling several cabbage pests.)**
NachrBl. dtsch. PflSchDienst Berlin, 1949, **3**: 130-7, bibl. 1.

The tabulated results indicate that the proprietary BHC preparation used in these trials (1) is of equal toxicity to cabbage root fly as are mercurial insecticides; (2) has a better residual effect than the latter type of chemical; and (3) in addition gives protection against flea beetle if applied twice. Spraying with DDT failed to control the pest. The trials were carried out on cauliflower, which did not show any off-flavour.—Aschersleben Branch of the Biol. Zentralanstalt.

2783. HILLS, O. A., AND TAYLOR, E. A.
Effect of curly top-infective beet leafhoppers on cantaloup plants.
J. econ. Ent., 1949, **42**: 897-900, bibl. 3, illus.

Beet leafhoppers, *Circulifer tenellus*, known to be vectors of curly top, were encaged in Arizona on cantaloup plants of the variety known as Powdery Mildew Resistant No. 45 in the cotyledon and two-leaf stages of development. Insects encaged on the plants in the cotyledon stage for 1 week caused either drastic stunting or eventual death to every plant. Some resistance to curly top virus had developed before the plants reached the two-leaf stage, as none died and the retardation of growth was not so drastic. When one infective leafhopper fed on plants in the cotyledon stage for 24 hours, some of these became stunted, whereas others did not seem to be affected. No symptoms characteristic of curly top developed in any of the experiments.

2784. ERWIN, A. T.
An interesting Guatemalan chilli (*Capsicum guatemalense* Bitt.).
Plant Research in the Tropics (edited by I. E. Melhus), 1949, pp. 612-14, bibl. 6, illus., being *Res. Bull. Iowa agric. Exp. Stat.* **371.**

C. guatemalense, a perennial, black-seeded pepper, is described. It might be of value for crossing with *C. frutescens*, as it appears to be free from certain pathogens affecting the latter.

2785. ANGELI, L.
Öntözési módok és az öntözöviz mennyiségének hatása a paprika termésmennyiségére. **(Irrigation practices and the influence of amount of water on the yield of peppers [*Capsicum annuum*].)** [German summary ½ p.]
Bull. Fac. Hort. Buda., 1949, **13**: 75-86.

The two most widely used methods of irrigation in Hungary are flooding in a series of basins from raised irrigation trenches and using shovels to splash the plants with water collected in furrows. In trials with sweet peppers the former proved the better method. Ripening was found to depend neither on the method of irrigation nor on the quantity of water but on temperature. The time at which to irrigate must also depend on temperature, and it is only worth doing when the monthly average is over 20° C.

2786. LEYENDECKER, P. J.
1949 plant disease survey for New Mexico.
Plant Dis. Reptr, 1950, **34**: 39-40.

Among the diseases mentioned, what is thought to be an undescribed virus disease of chilli pepper (*Capsicum frutescens*) was observed in 1948 and 1949. It caused

a slight mottling and thickening of the leaves, an enlargement of the calyx and sterility of the flower.

2787. Volcani, Z.
A disease on green sweet pepper fruits caused by *Bacillus polymyxa*.
Palest. J. Bot. (*R*), 1949, **7**: 142-55, bibl. 18, illus.

Studies, including histological examinations and pathogenicity tests, are described on a spore-forming bacterium identified as *Bacillus polymyxa* found causing a spot disease on green sweet pepper fruits in south and central Palestine in 1947. A strain of the bacillus has been found to be pathogenic to stored potato tubers and several other vegetables under laboratory conditions. Inoculation of sweet pepper leaves failed to produce signs of infection, but attached and detached tomato fruits became infected. The literature on plant diseases caused by spore-forming bacteria is reviewed.

2788. Szirmai, J.
Vegyszeres védekezési kisérletek a füszerpaprika palántavésze ellen. **(Chemical control of damping-off of pepper seedlings.)** [English summary 1 p.]
Bull. Fac. Hort. Buda., 1949, **13**: 127-34.

Good control of damping-off caused by *Rhyzoctonia solani* was achieved in Hungary in hot frames, cool frames and seed beds, with formalin, zinc oxide, Abavit, bordeaux mixture and zinc sulphate.

2789. Malaguti, G., and Pontis, R. E.
***Phytophthora capsici* in Venezuela.** [Italian with English summary 6 lines.]
Riv. Agric. subtrop., 1950, **44**: 4-12, bibl. 16, illus.

The occurrence of *Phytophthora capsici* in Venezuela is reported for the first time as causing pepper blight, buckeye rot of tomato, and fruit rot of squash. Suggestions are made for its control based on certain field practices, such as planting the seedlings on the top of the ridges so that the irrigation water does not come in direct contact with the roots; disinfecting the soil of seed beds and spraying the seedlings with bordeaux mixture; transplanting healthy plants only. In the field, rotation must be practised, for the fungus can remain alive in the soil for two years.—Istituto Nacional de Agricultura, Maracay, Venezuela.

2790. Anon.
Imperida, new carrot variety.
Seed World, 1950, **66**: 10: 32B, illus.

This new variety probably originated as a natural cross between Imperator and Red Core Chantenay. It has been selected by the University of Idaho Agricultural Experiment Station and is being introduced this year. The tops are shorter and the roots slightly longer than those of Imperator, and on irrigated land in Idaho it will reach bunching size in 95-100 days.

2791. Wahlin, B.
Borbrist och rotfruktsodling—några aktuella kommentarer. **(Some topical comments on boron deficiency in root crops.)**
Växtskyddsnotiser, 1949, No. 5, pp. 14-16.

Including a description of boron deficiency symptoms in carrots as they appear in the province of Östergötland. Correction by manurial treatment is discussed.

2792. Handford, R. H.
***Lygus campestris* (L.): a new pest of carrot seed crops.**
Canad. Ent., 1949, **81**: 5: 123-6, bibl. 1, from abstr. in *Rev. appl. Ent.*, 1950, **38 A**, pp. 183-4.

Yields of carrot seed in the Grand Forks district of British Columbia were greatly reduced during 1947 and 1948, largely as a result of infestation by *Lygus campestris*. Observations on its life-history in British Columbia are recorded. A first application (4-5 June) of DDT dust gave 80-98% control, and a second (22 June) 95-99%.

2793. Smolák, J.
Kokotice rolní přenašečem viru. **(Dodder as virus vector.)** (English and Russian summaries ¼ p. each.]
Ochr. Rost., 1949, **22**: 55-8, bibl. 6, illus.

A case of dodder, *Cuscuta arvensis*, occurring on carrots in a Prague suburb is described, and the probability of its role as virus vector is suggested.

2794. Kvíčala, B. A.
Studie o složené povaze virusové mosaiky květáku se zvláštním zřetelem k selektivnímu přenášení jednotlivých virusů tuto chorobu způsobujících některými druhy mšic. **(Studies on the composite nature of cauliflower mosaic with special regard to the selective transmission of both viruses in this complex disease by certain aphids.)** [English summary 3½ pp.]
Acta Univ. Agric. Silvic. Brno, Sign. **C40**, 1948, pp. 87, bibl. 100, illus. [received 1950].

The aetiology of cauliflower mosaic was studied in cauliflower and chinese cabbage. Two viruses, *Brassica Virus* 1 and *B.V.* 3, both sap and insect transmissible, were found to be responsible; their characteristics are described and their effects are differentiated. *Myzus persicae* and *Brevicoryne brassicae* were found to be good vectors for B.V. 1 and B.V. 3, *Myzus ornatus* for B.V. 3. The relationship between the viruses and the vectors was investigated, with particular reference to fasting periods, length of infective feeding and the action of intestinal and salivary enzymes. The nature of selective transmission of B.V. 3 by *M. ornatus* is discussed.—Institute for Plant Protection, Brno, Czechoslovakia.

2795. Starý, B.
Bejlomorka zkadeřujíci (*Cecidomyia nasturtii* Kieff.) nový škůdce květáku u nás. **(Gall midge (*Cecidomyia nasturtii*) a new pest of cauliflower in Czechoslovakia.)** [Russian summary ¾ p.]
Ochr. Rost., 1949, **22**: 226-30, illus.

Curdlessness and other malformations of cauliflowers appearing in vegetable growing areas of Czechoslovakia in recent years, have been attributed to the action of *Cecidomyia nasturtii*. The biology and a description of the pest are given. Control measures quoted from French and Swiss experience include the use of DDT (Gesarol), nicotine preparations, and hexachlorocyclohexane. Destruction of infested plants and of cruciferous weeds in the vicinity is advised.

The editor notes that other factors such as viruses may be partly responsible.

2796. Nelson, R.
Control of celery early blight in 1948 and 1949.
Quart. Bull. Mich. agric. Exp. Stat., 1950, **32**: 562-74, bibl. 10, illus.

For the past 10 years in Michigan a cuprous oxide-sulphur dust effectively controlled early blight caused by *Cercospora apii*. In experiments with new fungicides in 1948 and 1949 a dithane Z-78-sulphur dust was found more effective and yields were higher than on plots dusted with other fungicides. A tribasic copper sulphate-sulphur-zinc dust was slightly inferior in blight control and yields were somewhat lower in plots dusted with it, than in the dithane plots. Acti-dione [a by-product of the manufacture of streptomycin] dusts were ineffective in blight control, but stimulated vegetative development of the celery, and yields in acti-dione plots, despite serious development of early blight, were as high as those in the plots dusted with effective fungicides. [From author's summary.]

2797. Snyder, W. C., and Baker, K. F.
Occurrence of *Phoma lingam* in California as a subterranean pathogen of certain crucifers.
Plant Dis. Reptr, 1950, **34**: 21-2, bibl. 7.

Black leg of crucifers (*Phoma lingam*) has been found as a subterranean disease of some cultivated cruciferous crops in certain areas in California. Once it is introduced into a field with seed or infected transplants, the fungus may persist there indefinitely, even under semi-arid conditions, when crop rotation is not practised.

2798. Novák, J. B., and Svoboda, J.
Mandelinka hlaváčková—nový škůdce řepky u nás ? **(A new pest of cruciferous plants in Czechoslovakia ?)** [English summary 9 lines.]
Ochr. Rost., 1949, **22**: 129-35, bibl. 4, illus.

Entomoscelis adonidis, only recently observed in Czechoslovakia, has been found attacking cruciferous plants including Brassicas in the last two years. The initiation of control measures is recommended.

2799. Anon.
Ohio announces new cucumber variety.
Seed World, 1950, **66**: 10: 36.

Ohio MR17 is highly resistant to strains of cucumber mosaic encountered in Ohio. Processing tests have given favourable results. It was obtained from a cross between Chinese Long and Early Russian, backcrossed several times with National.

2800. Wittwer, S. H., and Tyson, J.
Yields of pickling cucumbers as influenced by rates of fertilizer application, fertilizer placement and nitrogen side dressing.
Quart. Bull. Mich. agric. Exp. Stat., 1950, **32**: 535-9.

The data suggest that on the fairly productive soils of Michigan used in these experiments, band applications up to 500 lb. per acre of a 3-12-12 fertilizer will prove profitable in pickle cucumber production. On poorly drained soils of low fertility, this amount may be increased to 800 lb. broadcast and 200 lb. of ammonium nitrate added as a side dressing. [Authors' conclusions.]

2801. Seljaninov, G. T.
A method of obtaining constant yields of cucumbers. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 4, pp. 56-8.

The year 1949 was very cold in the Leningrad district and cucumber yields were generally low, but at the Pushkin plant breeding institute almost normal crops were obtained by growing the plants in " living coulisses ", the cucumbers being planted in alternate strips with winter barley.

2802. Ellis, D. E., and Cox, R. S.
Dusting cucumbers to control downy mildew.
Bull. N.C. agric. Exp. Stat. **362**, 1950, pp. 16, bibl. 13.

Cucumber downy mildew (*Peronoplasmopara cubensis*), its symptoms, and the conditions favouring its appearance, are described. The fungicide which has given the most consistently beneficial results in North Carolina tests is tribasic copper sulphate dust, containing 5% metallic copper, in a suitable diluent such as pyrophyllite or talc. It is applied once every 10 days, and, in addition, after each rain heavy enough to wash off the dust ($\frac{1}{4}$ inch or more), at the rate of 15 to 20 lb. per acre early in the season, 35 to 50 lb. later.

2803. deZeeuw, D. J., and Vaughn, J. R.
An antibiotic of potential value in field control of cucumber scab.
Plant Dis. Reptr, 1950, **34**: 7-8.

In spraying trials on cucumbers for the control of scab (*Cladosporium cucumerinum*) the plants sprayed with 10 p.p.m. cycloheximide had very significantly less scab than the controls.

2804. Dimock, A. W., and Lear, B.
Soil treatments with parathion for the control of root-knot nematode and golden nematode.
Phytopathology, 1950, **40**: 460-3.

For root-knot nematode (*Heterodera marioni*) test plants were cucumbers grown in pots of infested soil. Tests were also made against the cysts of the golden nematode (*H. rostochiensis*). The results showed that parathion, when thoroughly mixed with the soil prior to planting is effective in preventing root-knot nematode infection, even with rather low doses. The tests with the golden nematode suggest that the nematodes are killed in the soil, though immunization of the host may also occur.—Cornell Univ., Ithaca, N.Y.

2805. Singh, R. N.
Studies in the floral biology of *Trichosanthes* Linn.
Indian J. Hort., 1950, **7**: 1: 1-13, bibl. 20, illus.

Species of Cucurbits studied were *Trichosanthes dioica* (the parwal), a vegetable widely cultivated in eastern India, *T. anguina*, the snake gourd which is cultivated in southern India, and *T. cucumerina*.

2806. CURTIS, L. C., AND SCARCHUK, J.
Dimorphic female blossom and fruit types, on the same plant in *Cucurbita pepo*.
J. Hered., 1950, **41**: 87-90, illus.

At the Connecticut Agricultural Experiment Station, in 1945, a plant in a segregation line of *Cucurbita pepo*, while otherwise normal in characteristics, bore fruits of two distinct shapes. On the progenies, during the following years 3 different types of flowers, e.g. normal female, modified female and male, were observed. The occurrence of these dimorphic female blossoms and fruits is attributed to genetic rather than environmental factors and is possibly instigated by the action of a chemical substance or substances.

2807. CROWELL, H. H., AND MORRISON, H. E.
The phytotoxicity to cucurbits of some new insecticides.
J. econ. Ent., 1950, **43**: 14-16, bibl. 3.

Arising out of control studies in Oregon on the squash bug, *Anasa tristis*, and western spotted cucumber beetle, *Diabrotica 11-punctata*, small-scale tests have been made on the phytotoxic effects of certain newer insecticides on commercial varieties of *Cucurbitaceae*. Results over 2 or 3 years are summarized. With a few exceptions, the insecticides used were not consistent in producing burning and chlorosis on any one cucurbit variety. The squash varieties, *Cucurbita maxima* seem to be most tolerant to the organic insecticides. Methoxychlor (5%) is probably safe for *Diabrotica* control in dry weather. The incorporation of sulphur (for mite or fungus control) in the insecticidal dusts may produce serious plant injury to cucurbits.

2808. HALL, W. C.
Artificial dioecism in relation to physiological ontogeny of the gherkin, *Cucumis anguria*.
Bot. Gaz., 1950, **111**: 457-70, bibl. 37, illus.

The physiological responses and growth of the normally monoecious gherkin, *Cucumis anguria*, were studied under varying degrees of artificially imposed dioecism and compared with those of normal plants. Minimal and maximal periods in the rate of vegetative growth were noted. Despite sexual modifications, all series followed closely the basic trends described, differing only in the quantitative aspect. The induced dioecious series, in which pistillate flowers were unpollinated or removed consistently, excelled in magnitude of vegetative stem and leaf, and flower production. The postulated role of growth substances as a possible factor in accounting for the ontogenetic fluctuations is discussed. Alterations in the rate of absorption of water and nutrients and changes in the reaction of the substrate seemed to be closely correlated with certain stages of the life cycle. A pre-flowering drop in the rate of water and mineral uptake and pH changes of the nutrient cultures are suggested as indexes to the presence of flower primordia in the gherkin, often before they are macroscopically visible. The consistency among series in displaying these substrate alterations suggest also the influence of pre-formed hormonic agents in the regulation of these processes. At the final sampling the fruiting plants had the lowest total fresh, dry and ash weights, and total carbohydrates, but the highest relative amounts of total nitrogen. It is concluded that, if normal flowering and fruiting are interfered with, metabolic derangements and alterations result. A possible explanation for the superiority of non-fruiting plants in most growth increments might be due to utilization of accumulated organic reserves, under the stimulus, and perhaps impaired translocation, of growth substances produced outside the reproductive structures. These normally would lead to flowering and fruiting. [From author's summary.]—Agric. and Mech. Coll., Texas.

2809. BROOKS, L. E., AND HARVEY, C.
Experiments with guar in Texas.
Circ. Tex. agric. Exp. Stat. **126**, 1950, pp. 10, bibl. 5, illus.

Guar, *Cyamopsis tetragonoloba*, is a legume introduced into the U.S.A. from Eastern India where it is grown as a vegetable and forage crop. This paper is concerned primarily with its use for soil improvement and fodder, though mention is made of its seed as a source of mannogalactan.

2810. PASQUIER, R., DE LUCA, Y., AND MAUREL, H.
Essai de traitements au champ contre la bruche des lentilles. (**A field trial for the control of the lentil beetle.**)
Ann. Inst. agric. Algér., 1949 [published 1950], **4**: 10: 1-11.

In an experiment in Algeria, described in detail, HCC [HCH] and parathion, particularly the latter, significantly reduced damage caused by the lentil beetle, *Bruchus* (*Laria*) *lentis* Fröhl. The first application was made just after the first pods formed and the others at 8 to 10-day intervals. DDT was ineffective.

2811. HUDSON, J. P.
Planting glasshouse lettuce.
Fruitgrower, 1950, No. 2842, p. 1014.

In trials carried out at the School of Agriculture, Nottingham University, it was found that lettuce plants pricked out in boxes and subsequently transplanted into the glasshouse bed matured slightly earlier than those pricked out directly into the house. In spite of the increased labour cost involved by pricking out into boxes, this practice seems, on balance, economic, as the crop occupies the glasshouse for a shorter period.

2812. AGLIBUT, A. P., AND LAUDENCIA, P. N.
A study of the effects of different amounts of water on surface and subsurface irrigation of lettuce.
Philipp. Agric., 1949, **33**: 36-50, bibl. 9, illus.

In a series of three plantings water was applied to lettuce grown in Los Baños clay loam in tins in amounts ranging from 10% to 120% of the water-holding capacity of the soil on an air-dry basis. The water was applied either to the soil surface by sprinkling or by sub-irrigation. The frequency of application ranged from 25 to 42 days in the three experiments. Weights of lettuce and weights and lengths of roots obtained are tabulated. The most economical amount of water was between 20 and 40% of the water-holding capacity of the soil; below 20% and above 80%, yields tended to decrease. The sub-irrigated tins lost less water through evaporation than the surface-irrigated tins, required less frequent cultivation and produced more vigorous plants with better-developed roots and higher yields.

2813. Canham, A. E.
Soil warming allows an extra crop.
Grower, 1950, **33**: 1215.
Given the use of suitable varieties, such as Gotte à Forcer and Cheshunt Early Ball, and proper layout and management of electricity, soil warming to produce early lettuces should be profitable in England.

2814. Hartmair, V.
Eine künstlich erzeugte fertile tetraploid Melone. **(An artificially produced, fertile, tetraploid melon.)**
Bodenkultur, 1950, **4**: 142-4, bibl. 3, illus.
A 0·3% colchicine solution applied to the growing points of seedlings of *Cucumis melo* var. *flexuosus* was used to produce tetraploid plants. These forms showed increased vigour, modified leaf and flower shape and shorter but thicker fruit. A surprisingly good seed production was noted. First and second generations of selfings maintained the acquired characters, thus proving that the colchicine treatment had produced true mutation.—Horticultural Research Station, Weihenstephan.

2815. Gaylord, F. C.
Purdue Hawkesbury watermelon.
Seed World, 1950, **66**: 10: 28, illus.
An improved strain of the wilt-resistant Hawkesbury watermelon, developed by the Purdue University Agricultural Experiment Station, is introduced. This selection is earlier, the rind is of more uniform thickness and the flesh redder and of better quality than the commercial Hawkesbury. Foundation seed may be obtained from the Agricultural Alumni Seed Improvement Association, Lafayette, Indiana.

2816. Wilson, R. D.
A field response of rock-melons to molybdenum.
J. Aust. Inst. agric. Sci., 1949, **15**: 118-21, bibl. 8, illus.
Responses to applications of sodium molybdate are reported for a rockmelon [*Cucumis melo* L.] crop grown at Wetherill Park, N.S.W., on a soil having a pH of about 5·5. Visible responses were confirmed by tests of the interveinal leaf tissue with diphenylamine-sulphuric acid. The main symptoms of molybdenum deficiency of rockmelons appear to be stunting of affected vines, leaf chlorosis and marginal necrosis, especially of the older leaves. [Author's summary.]

2817. Fabricatore, J. A.
Intumescenze su frutti di cocomero (*Citrullus vulgaris* L.). **(Swellings on the fruit of water melons.)** [English summary 10 lines.]
Ann. Sper. agrar., 1949, 3 (N.S.): 1263-9, bibl. 5.
Swellings which occurred on melon fruits in Venetia in 1948 were examined. They appeared as pale green or brownish pustules, originating in one of the cortical layers, the vascular bundles or the first layers of pith. They are thought to have been due to the high humidity of a particularly rainy season. This factor was also responsible for the occurrence of circular spots on the fruits directly caused by *Colletotrichum* sp.

2818. Zaprometov, N. G.
Bacteriosis of melons and its control. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 5, p. 42.
Bacteriosis attacking melon cotyledons, leaves, shoots and fruit was first observed in Uzbekistan in 1945. The symptoms, which appear when the plant has 5-6 leaves, are briefly described; susceptible and resistant varieties are named. For control the use of resistant varieties and the disinfection of soil, before sowing, with mercury preparations are recommended. Application of preparation NIUIF-1 in 1 : 1,000 solution for 10 minutes or sublimate in 1 : 1,000 for 5-10 minutes is suggested. During the growing period a 1% bordeaux mixture spray is also effective.

2819. B., G. T.
Okra seed.
Col. Plant Anim. Prod., 1950, **1**: 71-2, bibl. 5.
A note is given on the seed of okra, *Hibiscus esculentus*, on its cultivation, yields of seed and oil, and oil constants and uses.

2820. Ownbey, M.
The genus *Allium* in Arizona.
Res. Stud. Wash. St. Coll. Pullman, 1947 (published 1949), **15**: 212-32.
A critical study of the genus *Allium* has shown it to be represented in Arizona by 13 species, two of which each include two recognizable geographical varieties. These 15 taxonomic entities are described and a key is provided for their identification.

2821. Ownbey, M.
The genus *Allium* in Idaho.
Res. Stud. Wash. St. Coll. Pullman, 1950, **18**: 3-39.
Twenty-one species and varieties of *Allium* found in Idaho are described and a key for their identification is provided. Among them is *A. schoenoprasum*, which includes the cultivated chives.

2822. Warne, L. G. G.
An onion variety trial.
North. Gdnr, 1950, **4**: 123-6.
The purpose of this note is to indicate some of the difficulties which arose during the conduct of a variety trial, such as variation in quality of seed, the difficulty of getting uniform stands when thinning, the regrowth of plants broken off and not cleanly pulled up at thinning, and uneven losses due to onion fly attack. Such factors must be allowed for when analysing results.

2823. Garcia, G. M.
Progress report on the effect of pruning onion seedlings on the yield.
Philipp. J. Agric., 1949, **14**: 267-73, bibl. 1.
With onion seedlings transplanted on 30 December, 1947, and harvested on 19 April, 1948, untrimmed seedlings produced significantly heavier yields, both in number and weight of bulbs, than seedlings with roots trimmed at transplanting, and the latter gave significantly higher yields than plants in which both tops and roots had been trimmed.

2824. McKeen, C. D.
Preliminary studies on a pythium rootrot of Spanish onion seedlings.
Sci. Agric., 1950, **30**: 125-31, bibl. 3, illus.
In infection experiments, *Pythium irregulare* Buis. was shown to be highly pathogenic to Spanish onion seedlings, causing both pre-emergence and post-emergence damping-off. The attack on older seedlings was characterized by virtually complete necrosis of existing roots coincident with wilting, yellowing, stunting and occasionally death of all aerial parts. *P. irregulare* clearly duplicated the symptoms observed in large commercial plantings in southern Ontario, and may be considered the chief causal agent of rootrot attacking Spanish onion seedlings grown in steamed or in non-steamed soils. Arasan (50% tetramethyl thiuram disulphide), when added to steamed soil at the rate of 3·1 g. per cu. foot, effected considerable control. [From author's summary.]

2825. Wilcox, J., Howland, A. F., and Campbell, R. E.
Insecticides for the control of thrips on onions grown for seed in Southern California.
J. econ. Ent., 1949, **42**: 920-7, bibl. 5.
During 1945 and 1947 good control of onion thrips, *Thrips tabaci* L., and western flower thrips, *Frankliniella californica* (Moulton), was obtained with DDT. The best results were obtained over a 6-week period in 1945 and a 9-week period in 1947 by the weekly application of 30 lb./acre of a 10% DDT dust to the seed heads while they were opening and after they had opened. Spray tests in 1945 showed that DDT (1 and 1·5 lb. per 100 gal.) was more effective than tartar emetic (4 lb. per 100 gal.) or nicotine sulphate (1 lb. per 400 gal.).

2826. Wilcox, J., and Howland, A. F.
Effect of addition of sulfur to DDT dusts for onion thrips control.
J. econ. Ent., 1950, **43**: 11-13, bibl. 4.
Tests made in California in 1946 and in 1948 are briefly described and results are tabulated. Although they show some improvement in onion thrips (*Thrips tabaci*) control due to the use of 50% or more of sulphur in DDT, the difference between the mixtures and DDT dust without sulphur is not great. Higher temperatures appear to influence the action of sulphur favourably.

2827. Eichler, W.
Zwiebelminierschädlinge in Mitteldeutschland (1949). **(Onion mining pests in central Germany.)**
NachrBl. dtsch. PflSchDienst Berlin, 1950, **4**: 71-3, bibl. 6, illus.
In 1949 the following insects caused heavy damage to onion crops in central Germany: Onion fly (*Hylemyia antiqua* Meig), onion mining fly (*Dizygomyia cepae* Her.) and leek moth (*Acrolepia assectella* Zell.). Various observations, particularly on the difference in damage caused by the onion mining fly and the leek moth, are briefly described. No control measures are recommended. An E605 injection into onion leaves attacked by the larvae of the onion mining fly is mentioned as an experimental technique.

2828. Green, D. E., and Hewlett, M. A.
Parsnip canker. Summary of a report on investigations carried out during 1946-48 at the request of the Horticultural Group of the Agricultural Improvement Council.*
Agriculture, Lond., 1950, **57**: 216-22, bibl. 6.
In preliminary studies at Wisley, negative results were obtained from inoculations with bacterial cultures and from artificially produced injuries to the shoulders of roots below soil level. A much higher incidence of canker was found on heavy soil as compared with light, although on the latter, attacks by carrot fly were always more severe. This lack of relationship between carrot fly injury and canker is supported by figures from Staplake Mount, Devon. In trials in different parts of England with 17 stocks of parsnips comprising 10 well-known varieties, no variety proved resistant, but in February, 1949, roots of a suitable type, which still remained entirely free from canker, were collected as possible foundation stock for future selection. It is concluded that critical experimental work under carefully controlled conditions will be needed to determine the exact cause of parsnip canker, and suggestions are made on lines of procedure.

2829. Yadlin, E. V.
Ensayos de variedades de arveja para conserva. **(Variety trials of peas for canning.)** [English summary ¼ p.]
Agric. tec. Chile, 1949, **9**: 1: 53-66, bibl. 2.
One Chilean and 15 American varieties of pea were grown in variety trials carried out by the Chilean Ministry of Agriculture to determine their suitability for canning. Wisconsin Perfection and Little Gem 8974 are recommended for growing in Chile. The method of determining canning quality is described.

2830. Koródi, L.
Csávázószerek hatása a borsó csiraképességére. **(The effect of copper sulphate and other disinfectants on peas.)** [French summary ¼ p.]
Bull. Fac. Hort. Buda., 1949, **13**: 190-5.
While copper sulphate stimulates the germination of grains, it has an adverse effect on the germination and yield of peas. The author advises against the use of this disinfectant on other vegetable seeds without thorough testing, especially as different results were obtained from laboratory and from field tests.—University of Agricultural Science, Budapest.

2831. Wark, D. C.
The susceptibility of peas to four diseases occurring naturally in the Australian capital territory.
J. Aust. Inst. agric. Sci., 1950, **16**: 32-3, bibl. 1.
The diseases concerned were powdery mildew (*Erysiphe polygoni*), Ascochyta blight (*A. pisi*), Mycosphaerella blight (*M. pinodes*) and bacterial blight (*Pseudomonas pisi*). The observations summarized here, which were made during the seasons 1946 to 1949, covered over 300 varieties of *Pisum sativum* as well as related species of *Pisum* and *Lathyrus*.

* Copies of the full report can be obtained free from the Ministry of Agriculture, Advisory Services Branch, Cambridge Terrace, Regent's Park, London, N.W.1.

2832. STOLL, K.
Ein Beitrag zur Kenntnis der Chlamydosporenkeimung von *Ascochyta pinodella* Jones. **(Chlamydospore germination of *A. pinodella*.)**
NachrBl. dtsch. PflSchDienst Berlin, 1949, **3**: 96-100, bibl. 9.

Includes a discussion on the difficult problem of seed disinfection as a control measure against foot rot of peas.—Aschersleben Branch of the Biol. Zentralanstalt.

2833. STOLL, K.
Zur Methodik der Prüfung quecksilberhaltiger Beizmittel auf ihre Wirksamkeit gegenüber Fusskrankheitserregern der Erbse. **(Testing the efficacy of mercury-containing disinfectants against foot rot of peas.)**
NachrBl. dtsch. PflSchDienst Berlin, 1950, **4**: 58-62, bibl. 4, illus.

In laboratory and field tests at the Aschersleben Branch of the Biologische Zentralanstalt the disinfectants Ceresan UT 1875, Germisan-Universal 4099a, Abavit-Universal, and Fusariol in the usual (2, 3 or 4 g. per kg.) concentrations, gave reasonable protection to pea seeds artificially infected with chlamydospores of *Ascochyta pinodella*. All the disinfectants behaved similarly and no complete control was achieved. Some newer preparations, with higher mercury contents, were equally unsatisfactory. The protective action was only of limited duration and after a few weeks the root collar and epicotyl were attacked by the parasite. Nor were the disinfectants satisfactory against natural infection.

2834. DITMAN, L. P.
Pea aphid control.
Agric. Chemls, 1950, **5**: 5: 42-3, 95-6.

The author quoting data obtained at the Maryland Agricultural Experiment Station, discusses DDT (1% impregnated with 2% non-volatile solvent at 50 lb. per acre), rotenone and parathion as insecticides for pea aphid control and the correct timing of the treatment.

2835. STOLL, K.
Über Melaninbildung in Rettichschoten, hervorgerufen durch Kontaktinsektizide. **(The effect of contact insecticides on the formation of melanin in the pods of winter radish.)**
NachrBl. dtsch. PflSchDienst Berlin, 1949, **3**: 13-15, bibl. 1.

The occurrence of large black spots on the seed pods of winter radish and other cruciferous seed crops is a common phenomenon in central Germany. The spots, which were found to be due to the formation of melanin in the parenchyma, were observed only on the side exposed to the sun. They were produced artificially in the laboratory by applying to the pods one of the synthetic contact insecticides and by exposing them to ultraviolet light from a quartz lamp. The failure of epidermal cells to recover from plasmolysis showed that this tissue as well as the parenchyma was injured by the combined treatment. The severity of the damage varied according to the insecticide used.

2836. ATKINSON, R. G.
Studies on the parasitism and variation of *Alternaria raphani*.
Canad. J. Res., Sect. C, 1950, **28**: 288-317, bibl. 11, being *Contr. Sci. Serv. Dep. Agric., Ottawa*, **1017.**

The natural infection of radish seed with *A. raphani* may result in a lack of germination, a pre- or post-emergence blight, a distinctive lesioning of cotyledons and hypocotyls, the presence of scab-like lesions on table radish, and in the spotting and blighting of leaves, stalks, and siliques. The fungus was isolated from the internal tissues of all parts of dormant radish seed. Although the pathogen has been reported only on radish in Canada and the United States, the present investigation shows that Canadian isolates are capable of causing a severe leaf blight of stocks and wallflowers. Increased soil moisture was associated with increased seedling disease. At a high soil moisture content, infection was lowest at 18° C.; at medium soil moisture, it was lowest at 18° C. and also at 23° C., the next highest experimental temperature. *A. raphani* was shown to be capable of surviving at least 18 months in dry soil cultures with no loss of cultural habit, virulence, or sporulation. Appreciable increase in emergence and decrease in seedling infection was obtained by seed treatments with some of the common fungicidal dusts. [From author's abstract.]

2837. SØRENSEN, H. (STATENS FORSØGSVIRKSOMHED I PLANTEKULTUR).
Orienterende dyrkningsforsøg med skalotter. **(Preliminary trials with shallots.)** [English summary p. 1.]
Tidsskr. Planteavl, 1950, **53**: 307-20, being *Beretn. Statens Forsøgsvirks. Plantekult.* **424.**

After two inferior types of shallot, viz. a short-leafed yellow and a red-brown one, had been eliminated, the experiment was carried on with 8 long-leafed varieties of different origin. In a spacing trial the highest yields were obtained with a distance of 33 cm. between the rows; but at a distance of 50 cm., which is considered necessary for cultivation, yields were only slightly less if the same number of bulbs was planted per unit area. In another trial, in which different sizes—7·5, 15 and 30 g.—at different distances in the row—5, 10, 15 and 20 cm.—were compared, the two small bulb sizes planted at 5 cm. gave the biggest crop. The size of the bulbs harvested increased with distance of planting in the row and decreased as a result of planting larger bulbs. If speed of production is of greater importance than yield, small bulbs should be planted at the wider distances. Such small bulbs are obtained from large bulbs planted closely. In another trial a planting depth of 5 cm. proved superior to 10 cm., but it did not make any difference whether the bulbs were set in drills or pushed into loose soil. In a test of planting dates, about 1 April was the optimum as regards yields and bolting. Bulbs stored at about 20° C. from 15 January to 15 March yielded 72% more than the controls (average of 3 years) and there was no bolting in the heat-treated lots.

2838. GREENWOOD, D. E., AND HOFMASTER, R. N.
The efficiency of several new insecticides for the control of *Hymenia fascialis* on fall spinach.
J. econ. Ent., 1950, **43**: 108, bibl. 1.

A brief account on the performance of 10 insecticides, tested at the Virginia Truck Experiment Station.

2839. Bovien, P., and Knudsen, P.
Krusesygegalmyggen (*Contarinia nasturtii* Kieff.), dens biologi og bekaempelse. **(The swede midge; its biology and control.)** [English summary pp. 1½.]
Tidsskr. Planteavl, 1950, **53**: 235-57, bibl. 15.
The swede midge is one of the most serious cabbage pests in Denmark, causing crinkled leaves and a distortion of the young leaf stalks. Trials showed that the larvae are controlled effectively, either in the seed bed or in the field after transplanting, with nicotine, DDT or parathion. Correct timing of the treatment was found to be of great importance. In 1948, applications on 14 and 21 June reduced an infestation of 35% in the controls to less than 1% in the treated plots. Recent observations indicate that hymenopterous parasites also deserve attention as a possible control measure. The biology of the gall midge is discussed in detail.

2840. Lewis, M. T.
New sweet corn hybrid available to growers.
Science for the Farmer, April 1950, being *Suppl.* **2** to *Bull.* **515** (*62nd A.R. Pa agric. Exp. Stat.*), p. 9, illus.
" Penndale " 5S-2, bred for high quality, is a midseason variety especially suitable for frozen storage. It makes sturdy growth and produces large uniform ears.

2841. Mitchell, R. S., and Lynch, L. J.
Picking maturity of sweet corn for canning.
Food Pres. Quart., 1949, **9**: 72-3.
Of the various methods adopted, the determination of moisture content and the refractive index determination of the expressed juice were found most suitable. The 2 factors are mutually related, and high correlations have been obtained in an investigation by the Division of Food Preservation carried out over 4 seasons on material from Windsor, New South Wales.

2842. Anderson, L. D., and Hashe, J. W.
Control of corn earworm on sweet corn in Southern California.
J. econ. Ent., 1949, **42**: 933-41, bibl. 5.
During 1948, 12 experiments were made in 3 areas of southern California for the control of the corn earworm, *Heliothis armigera*. Eleven insecticides applied as dust, sprays, aerosols and as solutions by an oil injection method were tested. It was found that 1% DDT and 1% dichlorodiphenyl dichloroethane in mineral oil, applied by either the aerosol or the injection method, gave the best control of earworm on sweet corn. No applications should be made by either of these two methods until after pollination; no DDT residues were found on the edible portion of the ear. [From authors' summary.]

2843. Walton, R. R., and Bieberdorf, G. A.
The southwestern corn borer and its control.
Exp. Stat. Bull. Okla agric. Exp. Stat. **B-321**, 1948, pp. 23, illus.
Damage to early planted sweet corn is seldom severe, since the crop is harvested before the second generation of borer appears. The life cycle and control measures are outlined.

2844. Magelli, E.
La coltivazione del pomodoro in provincia di Piacenza. **(Tomato cultivation in the province of Piacenza.)**
Ital. agric., 1950, **87**: 224-9.
A comparison of yields from Italian and foreign tomato varieties. Fourteen varieties and seven unnamed hybrids are briefly described.

2845. Ministry of Agriculture and Fisheries.
Factors affecting the marketing of home-produced tomatoes in Great Britain.
Publ. Minist. Agric. Fish., econ. Ser. **51**, 1950, pp. 113, H.M. Stationery Office, London, 3s.
The following are among the figures quoted and suggestions made in this well documented account of the present state of the British tomato industry: In 1949 about 13,000 growers produced glasshouse tomatoes on about 3,200 acres in England and Wales, the Lea Valley being by far the most important district. Outdoor tomatoes were grown on about 2,750 acres on some 3,550 holdings, 58% of which lie in the South-East, especially in Kent and Essex. In Jersey the outdoor acreage of tomatoes amounted to 3,740 in 1948, on 1,430 holdings. For 1947, 350,500 tons are recorded as total supplies, 145,000 tons of which were home produced, 190,000 being imported fresh tomatoes and 15,000 tons imported tomato preserves. Mould resistance, heavy cropping and earliness are the characters which have made Potentate the most widely grown variety in Britain. " But ", it is asked, " how many growers put Potentate on their own table ? How many of the baskets put aside by wholesalers . . . for their own use have that variety in them ? " It is suggested that the industry as a whole should join in the efforts of research stations and private breeders to produce (1) a table variety that combines the advantages of Potentate with the quality of Ailsa Craig and (2) outdoor varieties that are as satisfactory for processing as those used overseas. An organization of the industry would also be required to step up research into such problems as the most efficient methods of glasshouse heating and cooling, and to facilitate mechanization of glasshouse construction by agreement on certain standard designs. Another urgent problem is the improvement of storage and conditioning techniques. The industry has expanded continuously for more than 50 years. At present, in the era of fuel restriction, actual tomato production in Britain is almost at its maximum, but when conditions change and other crops can be freely grown, the output may drop again.

2846. Lincoln, R. E., and others.
Breeding for increased ascorbic acid content in tomatoes.
Bot. Gaz., 1950, **111**: 343-53, bibl. 12.
This paper reports the progress made at the Purdue University Agricultural Experiment Station, Lafayette, in the breeding of commercial varieties of tomatoes with a high ascorbic acid content, and in increasing the ascorbic acid content of possible parental material. Some observations are made on the inheritance of ascorbic acid. A negative correlation between ascorbic acid content and fruit size was usually observed, but no constant relationship between ascorbic acid content

and percentage of dry matter, lycopene or β-carotene content. Many genes appear to be involved in the inheritance of high ascorbic acid content. Selections have been obtained that have a fruit size slightly smaller than commercial canning varieties but which contain about twice as much ascorbic acid. Further, selections of *L. peruvianum* have been obtained with an ascorbic acid content 4-5 times greater than that of commercial varieties. A rapid modified method of analysis for ascorbic acid is described.

2847. Moore, J. F., and Currence, T. M.
Combining ability in tomatoes.
Tech. Bull. Minn. agric. Exp. Stat. **188,** 1950, pp. 22, bibl. 20.
A method of predicting the hybrid performance of varieties is described in the light of experimental results.

2848. Frazier, W. A., and others.
Seven new tomatoes.
Bull. Univ. Hawaii agric. Exp. Stat. **103,** 1950, pp. 22, bibl. 8, illus.
Describes varieties raised in Hawaii resistant to spotted wilt, fusarium wilt and grey leaf spot. Their disadvantages as well as advantages are set out. They have been named Hawaii, Kauai, Lanai, Oahu, Maui, Molokai and Niihau.

2849. Mészöly, G.
Paradicsomfajták terméshozam és szárazanyagviszonya. **(The relation between yield and dry matter in tomato varieties.)** [German summary ½ p.]
Bull. Fac. Hort. Buda., 1949, **13**: 3-29.
At the Kecskemet Horticultural Experiment Ground 144 tomato varieties of various origins were compared. Varieties with small fruits were superior in yield and dry matter content to large-fruited varieties. The Hungarian hybrids were pre-eminent in yield and dry matter content. Low locule number and transport quality show a positive correlation, locule number and dry matter content a negative one. Refractometric dry matter examination enables an early detection of virus to be made.

2850. Ciccarone, A.
I frutti strozzati del pomodoro San Marzano. **(The grooved fruits of the tomato variety San Marzano.)** [English summary ½ p.]
Ann. Sper. agrar., 1950, **4** (N.S.): 647-65, bibl. 22.
The morphological phenomena leading to fruit constrictions in the San Marzano tomato are discussed. They are themselves probably dependent on climatic or seasonal factors and are less frequent in irrigated than in non-irrigated crops.

2851. Maxwell, N. P.
The tomato variety situation in the lower Rio Grande Valley of Texas.
Proc. 4th Annual Rio Grande Valley hort. Inst., 1950, pp. 43-6, bibl. 2.
In a preliminary spring trial in 1949 to find varieties that were satisfactory both for the "greenwrap" (early fresh market) and canning industries, 15 varieties were compared. Flowering and harvest dates and yields are tabulated. Valiant gave the highest yield of marketable fruit and was one of the earliest, but the fruit was rather subject to sunburn. Early Rutgers had the highest quality but was not early enough. Lakeland, though tending to produce small fruit, also showed promise. Further trials will clearly be needed.

2852. Porte, W. S., and Walker, H. B.
A new golden-orange wilt-resistant tomato.
Market Gr. J., 1950, **79**: 3: 12, illus.
Sunray, a cross between resistant variety Pan America and golden coloured Jubilee, bred at the Plant Industry Station, Beltsville, Md, fulfils the requirement of public taste for yellow tomatoes and can be grown in fusarium infested gardens. [See also *H.A.*, 20: 1687].

2853. Rick, C. M.
Pollination relations of *Lycopersicon esculentum* in native and foreign regions.
Evolution, 1950, **4**: 110-22, bibl. 13.
The possibility of producing commercial F_1 hybrid tomato seed in Peru is suggested by the results of the author's observations in that country. In the coastal parts of that country *Lycopersicum esculentum* is subject to high rates of natural cross pollination, whereas it is nearly always self-pollinated in those regions of the world where it occurs only as a cultivated plant and where rates of natural cross pollination have been measured.

2854. Oppenheimer, H. R.
La determination de l'ouverture stomatique chez la tomate. **(The measurement of stomatal opening in the tomato.)**
Palest. J. Bot. (*R*), 1949, **7**: 63-8, bibl. 4.
Amongst various methods developed for measuring stomatal opening in the tomato the immediate fixation of epidermal fragments in dioxane gave the best results. [Author's summary.]

2855. Tombesi, L.
Fotosintesi, respirazione, traspirazione in funzione del regime idrico. **(Photosynthesis, respiration and transpiration in relation to the water supply.)**
Riv. Ecol., 1949, **1**: 37-54, bibl. 8, illus.
Plants of the tomato variety S. Marzano grown under conditions of reduced water supply (50% normal) produced less than half the dry substance of that of plants with a normal water supply; the former showed a higher unit water consumption, more photosynthetic activity, lower respiration intensity, less transpiration, lower cellulose and lignin content, and more chlorophyll per gram of fresh substance.

2856. Minges, P. A., and others.
Tomato propagation.
Circ. Calif. agric. Ext. Serv. **160,** 1950, pp. 30, illus.
Market tomatoes in California are generally sown in seedbeds and transplanted. Methods used for plant raising are: direct seeding in a cold frame covered with muslin, raising in a seedbed and pricking out into a cold frame, direct seeding in a hotbed, sowing in flats in a greenhouse, sowing in an open but selected seedbed, and sowing in a field seedbed. Factors influencing the choice of method are discussed, and directions are given for the construction of frames and management

of seedbeds, including weed, pest and disease control and transplanting methods. Direct sowing in the field has recently been tried with considerable success in many of the canning tomato districts. The advantages and disadvantages of this practice are discussed. It is considered practicable for the autumn crop of market tomatoes in irrigated areas.

2857. Street, H. E., and Lowe, J. S.
The carbohydrate nutrition of tomato roots. II. The mechanism of sucrose absorption by excised roots.
Ann. Bot. Lond., 1950, **14**: 307-29, bibl. 38.

In the first article of this series (see *H.A.*, 19: 1293) it was shown that excised tomato roots are able to utilize sucrose at a much greater rate than either dextrose or laevulose, and the hypothesis was advanced that the mechanism of sucrose utilization involves the operation of a specific sucrose phosphorylase at the surface of the absorbing cells. The present investigation was undertaken to test this hypothesis. The following data were obtained: (1) Good growth of excised tomato roots is only obtained with initial pH values within the range 4·2 to 5·0, and there is a clearly defined optimum pH at 4·8 to 4·9. (2) Excised roots have a low requirement for inorganic phosphate. The symptoms of phosphorus deficiency are similar to those associated with carbohydrate deficiency. A rapid restoration of the sucrose absorbing ability of phosphorus-deficient roots results from an external supply of phosphate. (3) Phloridzin inhibits the growth of excised roots. No similar inhibition is observed using the attached seedling root. This phloridzin inhibition is reversible and proportional to the concentration of phloridzin used, and is partially counteracted by increasing the sucrose concentration. (4) Sucrose was the only sugar tested that can be readily utilized by excised roots as a carbon source. (5) Laevulose, galactose, xylose and maltose are toxic to excised roots simultaneously supplied with sucrose. Dextrose appears to act as a competitive inhibitor of sucrose utilization. (6) 2% sucrose was superior to the other concentrations used. At 0·5% concentrations, symptoms of carbohydrate deficiency were apparent. 4% concentrations caused a marked check to growth rate. It was shown that the unfavourable effect of media of high sucrose content was not a result of their high osmotic pressure. These data are shown to support the authors' theory of the mechanism of sucrose utilization.—Universities of Manchester and Nottingham.

2858. Went, F. W.
Factors affecting fruit set in vegetables.
Proc. 4th Annual Rio Grande Valley hort. Inst., 1950, pp. 47-53, bibl. 13.

A review of the literature on this problem with particular reference to temperature effects as determined for the tomato.

2859. Reinders-Gouwentak, C. A., and Smeets, L.
Een nieuw principe voor de toepassing van kunstlicht bij stooktomaten. **(A new principle for applying artificial light to tomatoes under glass.)**
Reprinted from *Groenten en Fruit*, No. 46, 25 May, 1950, 1 p., illus.

The method is one by which daylight is augmented during winter by artificially illuminating the plants during the forenoon, using the light from a high pressure mercury lamp.

2860. Homès, M. V., Ansiaux, J. R., and Ringoet, A.
Croissance et production des fruits chez la tomate (*Lycopersicum esculentum* Mill.) en rapport avec la taille. **(The effect of stopping tomato plants on growth and cropping.)**
Trav. Centre Ét. Rech. Aquicult. 1950, **3**: 89-114.

Tomatoes were grown in gravel culture and stopped after the 3rd or 5th truss. Commercially there is no advantage in stopping the plants after the 3rd truss, as the slight gain in earliness is more than offset by a loss of crop. The growth curve of the stem resembles an S resulting from the sum of the growth curves of the individual internodes. Stopping affects both rate of growth and final length of the internodes still growing at the time the operation is carried out. The growth curve of the leaves is also S-shaped, rate of growth and final size increasing with height. The top truss carries more flowers and fruits than the others, but the proportion of small fruits increases in each truss formed. In the course of the experiment it has been observed that the 3-truss-plants were shaded by the higher plants and as a result formed longer internodes and larger leaves without increasing their dry weight correspondingly. This shows that in the above-ground parts no simple relationship exists between size and weight. Full data of the study are tabulated.

2861. Avdonin, N. S., and Tertyčnaja, L. A.
Manuring tomatoes with granular superphosphate. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 4, pp. 48-51.

The advantages of applying granular superphosphate between the rows for tomatoes, over broadcasting powdered superphosphate, are shown.

2862. Baldoni, R., and Laurini, M.
Prova di concimazione borica al pomodoro. **(Tests on the use of boron in the tomato fertilizer.)** [English summary 7 lines.]
Ann. Sper. agrar., 1950, **4** (N.S.): 393-402, bibl. 60.

Results are given of 2 years' field trials in a good tomato soil at Fidenza in the province of Parma, the analysis of which showed no trace of boron. The trial was laid out in a 5×5 latin square on 25 plots of 22·5 sq. metres each with about 80 plants per plot. Under conditions obtaining, the efficacy of adding 35 kg./ha. of borax to the normal NPK fertilizer is indicated. The addition of smaller or larger amounts (70 kg./ha.) had no effect.

2863. Singh, S. N., and Joon, B. S.
Root development and yield of *Lycopersicum esculentum* Mill. var. Best of All in relation to varying moisture supply.
Curr. Sci., 1950, **19**: 182-4, bibl. 2, illus.

Best of All tomatoes were subjected at Kanpur to four depths of irrigation, ½ in., 1 in., 2 in., and 3 in., every fortnight. Comparing light irrigation (½ in.) with heavy (3 in.) the plants receiving the former sent roots

down to an average depth of 6·8 ft. compared with 4·1 ft., made fewer but longer branch roots near the surface, produced 119% heavier total dry weight of roots and gave a significantly higher yield of fruit.

2864. Breazeale, E. L., McGeorge, W. T., and Breazeale, J. F.
Moisture absorption by plants from an atmosphere of high humidity.
Plant Physiol., 1950, **25**: 413-19, bibl. 4, illus.

Three experiments are described which show that a tomato plant can absorb water from a saturated atmosphere, transport it to the roots, and build up the soil moisture to or above field capacity. The absorption is greater and the rate more rapid from a fog which maintains an abundance of free water on the surface of the leaves than from an atmosphere of 100% humidity. The plants will grow to maturity, flower and set fruit with no other source of water than that absorbed through their leaves. The techniques used are illustrated.—Arizona agric. Exp. Stat.

2865. Wain, R. L.
Studies on plant-regulating substances. I. Field trials using various synthetic compounds for the setting of outdoor tomatoes.
J. hort. Sci., 1950, **25**: 249-63, bibl. 17, illus.

Each of the treatments employed on the bottom trusses led to a significant increase in yield of fruit over that obtained from unsprayed control plants, the mean increase in yield due to treatment being 29·5%, 37·9%, and 299·3% in the three trials. Weather conditions during the period at which normal fertilization could take place largely influenced the increase in yield obtained by spray treatment. Sprays containing dichlorophenoxyacetic acids at 4 p.p.m. and α-(2-chlorophenoxy)-propionic acid at 50 p.p.m., though effecting good sets, produced fruit of inferior quality. β-naphthoxyacetic and α-(2-naphthoxy)-propionic acids at 60 and 100 p.p.m. respectively gave satisfactory results. A mixture of β-naphthoxyacetic acid at 40 p.p.m. and *p*-chlorophenoxyacetic* acid at 10 p.p.m. gave an excellent set of good quality fruit and was considered the best of the sprays examined.—Wye College, Univ. of London.

2866. Finn, H., and Wain, R. L.
Hormone sprays help outdoor tomatoes.
Grower, 1950, **33**: 1117-19.

In 4 trials at Nackington Farms and Wye College, Kent, over 3 years, spraying the bottom trusses of outdoor tomatoes with hormones increased the yields of those trusses by 21·2, 29·5, 37·9 and 299·3% compared with unsprayed controls. The fourth figure is explained by poor setting conditions at the time of flowering. Compounds found to be almost equally effective were the methylglucamine salts of α-(2 chlorophenoxy)-propionic acid at 40 p.p.m., a mixture of β-naphthoxyacetic acid at 40 p.p.m. and 4-chlorophenoxyacetic* acid at 10 p.p.m., α-(2-naphthoxy)-propionic acid at 100 p.p.m. and β-naphthoxyacetic acid at 60 p.p.m. [See also previous abstract.]

* Alternative terms.

2867. Reinders-Gouwentak, C. A., and Bing, F.
Action de l'acide α-naphtylacétique contre la chute des fleurs et des fruits de la tomate et son influence sur la couche séparatrice des pédicelles. **(The action of α-naphthaleneacetic acid in the prevention of blossom and fruit fall in the tomato, and its effect on the separation layer of the pedicels.)** [English summary p. 1.]
Reprinted from *Proc. Akad. Wet. Amst.*, 1948, Vol. **51**, No. 9: pp. 14, bibl. 20, illus.

Results are presented of the first part of a study of flower and fruit fall in the tomato. In these experiments, carried out at Lab. voor Algem. Plantkunde, Wageningen, the 3 varieties Vetomold 121, Tucqueen, and Ailsa Craig were grown under various conditions of temperature and humidity under glass. The thermoperiodicity observed by Went [see *H.A.*, 14: 1763] with Californian varieties was found to apply also to these European varieties, although they required lower night temperatures for fruit set; temperatures of 10-15° C. were required for a period of longer than 7 hours nightly. Initiation of flowers took place even under tropical conditions, but such conditions resulted in a serious fall of blossoms and young fruits. Thermoperiodicity was shown only by small fruit, however; those which had attained a diameter of 1 cm. did not fall when brought into tropical conditions. Blossom and fruit fall was prevented by 2 sprays, at a 7-day interval, with an aqueous solution of α-naphthaleneacetic acid at 25 mg./l. Detailed observations were made on the morphological and anatomical effects of treatment on the separation layer and surrounding tissue in the pedicels. In treated pedicels the articulation zone developed earlier and was larger than in untreated ones, and the fruits were difficult to detach. The cortex, wood and pith zones were larger in treated pedicels; there were less unlignified areas in the wood, and the pith did not always contain an area of lignified cells.

2868. Gagnard, —.
Application des phytohormones aux cultures de tomates. **(The application of phytohormones to tomatoes.)**
Rev. hort. Algér., 1950, **54**: 66-75.

The present state of knowledge regarding the use of hormone sprays on tomatoes is discussed. Results obtained in Algeria on the hastening of ripening are similar to those obtained elsewhere.

2869. Cottenie, A., and de Necker, A.
Essais comparatifs sur la nouure des tomates. **(Comparative trials of substances for inducing fruit set in tomatoes.)**
Rev. Agric. Brux., 1949, **2**: 535-40, bibl. 5, illus.

The following 5 organic compounds were tested: a commercial product based on monochlorophenoxyacetic acid at 3·6 g. per l. water; chlorhydrate paraphenylenediamine, 50 mg. per l.; β-indoleacetic acid, 50 mg. per l.; β-indoleacetic acid+chlorhydrate paraphenylenediamine, 50 mg. per l.; and paraphenylenediamine, 50 g. [mg. ?] per l. The tomato variety Tuckwood was used, grown in the open, and the first 3 trusses of each plant were treated. Treatment with the commercial product resulted in a lower set of fruit,

but a higher yield than any of the other treatments or the control, the fruits being larger and ripening a few days earlier. Chlorhydrate paraphenylenediamine gave a slightly higher yield than the remaining 3 compounds, but otherwise there was little difference, either in percentage fruit set or yield, between the various treatments and the control.

2870. McKay, R.
A physiological breakdown in tomatoes caused by high temperatures in 1949.
J. roy. hort. Soc., 1950, **75**: 288-91, bibl. 2.

An external discoloration and an internal necrosis of tomatoes grown in unshaded glasshouses, not hitherto observed in Ireland, were seen by the author in July, 1949. Both green and partially ripe fruit showed large, glossy, blackish areas, indefinite in outline, mainly around the circumference of the fruit, rarely present on the stem end. When cut, the blackish areas were found to be more or less necrotic; no organism was detected in the damaged tissues. In the author's opinion this breakdown was due to extremely hot weather, aggravated probably by wide fluctuations between day and night temperatures. It is suggested that the symptoms observed on immature tomatoes are only a very severe stage of the blotchy ripening disorder sometimes found in fruit approaching maturity.

2871. Bing, F.
Over een ongewone vruchtval bij tomaten. **(On an abnormal fruit drop of tomatoes.)** [French summary 1¼ pp.]
Tijdschr. PlZiekt., 1950, **56**: 161-3.

A severe fruit drop, associated with blossom end drop in Marglobe tomatoes in 1949, is described. Possible causes are discussed.

2872. Holmes, F. O.
Internal-browning disease of tomato caused by strains of tobacco-mosaic virus from *Plantago*.
Phytopathology, 1950, **40**: 487-92, bibl. 5.

Outbreaks of internal-browning disease of tomato in New Jersey were found to be closely associated with mosaic of plantains (*Plantago* sp.), suggesting that the weed was a source of infection for the tomatoes.—The Rockefeller Inst., New York.

2873. Bailey, P.
Mildew resistant tomatoes are late in ripening.
Grower, 1950, **34**: 29, 31.

From an unreplicated trial in a commercial glasshouse with several of the new John Innes mildew resistant tomatoes compared with non-resistant commercial varieties, the latter produced earlier and larger fruit and somewhat higher total yields.

2874. Brock, R. D., and Giles, J. E.
Control of root-knot nematode in tomatoes by soil fumigation.
J. Aust. Inst. agric. Sci., 1949, **15**: 154-8, bibl. 2, illus.

In an experiment with tomatoes at Red Cliffs, Victoria, fumigation of the field soil with D-D greatly reduced infestation by root-knot nematode, *Heterodera marioni*, and increased yields three-fold compared with untreated controls. Fumigation of the seedbed alone proved valueless when the plants were subsequently transplanted into untreated, infested soil. Seedbed treatment was, however, clearly beneficial when the field soil was clean or had been disinfected.

2875. Michelbacher, A. E., Middlekauff, W. W., and Hanson, C.
Tomato insect control.
Agric. Chemls, 1950, **5**: 6: 30-1, 95-8, bibl. 3.

The use of DDT and DDD in the tomato insect control programme in northern California during 1949 resulted in excellent control of caterpillars attacking tomato. This was obtained with not more than three properly timed and thoroughly applied treatments and sometimes only two. DDD, as being more effective than DDT in controlling the tomato hornworm, *Protoparce sexta* (Johan.), was used more extensively. In three years' tests, a 10% toxaphene dust and a 5% toxaphene-3% DDT dust have both proved promising for caterpillar control. Excellent control should result where 5% DDT or 5% DDD dusts are applied at the rate of 30 lb. to the acre. To insure the control of the tomato mite, *Phyllocoptes destructor* Keifer, these materials should be used in combination with not less than 50% sulphur. A 10% toxaphene dust or a 5% toxaphene-3% DDT dust should also be used in combination with sulphur applied at the rate of 30 lb. to the acre. A spray programme is recommended. [From authors' summary.]—Univ. Calif., Berkeley.

2876. Wene, G. P.
Control of the suckfly on tomato.
J. econ. Ent., 1949, **42**: 983, bibl. 2.

1% lindane, 5% methoxychlor, 5% DDT and 82% sulphur, 5% chlordan, and 10% toxaphene with 40% sulphur were all effective in dust form for the control of the suckfly, *Dicyphus minimus*, on tomatoes in Texas.

2877. Jany, E.
Beobachtungen über das Auftreten des Kohlgallenrüsslers (*Ceutorrhynchus pleurostigma* Marsh.). **(Observations on the occurrence of the turnip gall weevil.)**
NachrBl. dtsch. PflSchDienst. Braunschweig, 1950, **2**: 97-9, bibl. 7.

Kale and cauliflower seem to suffer more than kohl rabi or white and red cabbage. Dusting, spraying with a benzol hexachloride preparation soon after germination or the use of bait plants such as rape, are recommended.

2878. Van Slijcken, A.
Essais sur la résistance des navets à la maladie digitoire. **(Trials to determine the resistance of turnip varieties to club root.)**
Rev. Agric. Brux., 1949, **2**: 425-38, illus.

Clubroot disease (*Plasmodiophora brassicae*) is such a serious problem on the acid, sandy soils of Daknam, Wichelen and Aarsele in Flanders that in some cases turnips can no longer be grown. In 1947 a variety trial was carried out at the State Research Section for Plant Improvement, Melle, to compare the resistance of 17 local and foreign varieties. The effect of liming was also investigated, but it was found that the application of 2,000 kg. magnesium limestone per ha. at the time of sowing was of no value in reducing infection. It was also observed that the amount of infection at thinning time was closely proportional to the amount

at harvesting. Only 2 of the varieties tested showed resistance: these were both local varieties, 146R, a long, white, blue top, and 147R, a round, white, chicory leafed type. Further trials in 1948 confirmed the resistance of these 2 varieties, 146R showing almost complete immunity and 147R being susceptible in heavily infected ground but so slightly damaged that its value was not reduced. 147R was the more frost resistant and had the higher dry matter content of the two. Good strains of these two varieties are now being selected.

Potatoes.

(*See also* 2456, 2725, 2740, 2787, 3381, 3383.)

2879. Bald, J. G., and Oldaker, C. E. W.
Testing and maintenance of potato clones.
Emp. J. exp. Agric., 1950, **18**: 95-104, bibl. 8.

Trials carried out over several years, mainly at Tewkesbury, Tasmania, are described from which the authors draw the following conclusions: " 1. Simple yield trials are insufficient as a means of testing and characterizing potato varieties or clones. 2. Variation in maturity between clones within the same variety has given stocks of Victorian Carman and Tasmanian Brownell adapted to local environments. 3. In a study of twelve Up-to-Date clones those of later maturity on the whole gave higher yields than those of earlier maturity. This rule did not hold when the growing period was shortened by early harvest, frost, or disease. 4. Examples are given of transitory differences in yield obtained when clones of the same maturity were harvested prematurely. It does not follow that two clones of similar maturity will pass through the various stages of their development at exactly the same time. 5. These transitory variations between clones may be made final by early harvest or the incidence of particularly favourable or unfavourable conditions of environment at some stage in their development. 6. Examples are given of variant clones of Up-to-Date and Brownell that are consistently capable of outcropping other clones of similar maturity when grown under certain environmental conditions." In discussing the use of clones for certified seed it is suggested that selection should be based not only on suitability to environment but on stability in performance, by which is meant the production of good yields in those many cases in which crops fail to reach full maturity through accidents associated with weather, disease, etc. Where two clones of similar maturity date give comparable returns over a series of trials, but may vary in favour of one or the other from trial to trial, it might be advisable to grow a mixture of the two clones. Methods of testing, maintaining and multiplying selected clones are discussed briefly.

2880. Rose, D. H., and Cook, H. T.
Handling, storage, transportation, and utilization of potatoes. A digest of information on the subject published mostly from 1938 to 1948.
Bibl. Bull. U.S. Dep. Agric. **11**, 1949, pp. 163, bibls. numerous.

This report is the first in a series intended to cover the biology and physical handling of important horticultural crops during the marketing period. It is a digest, for the use of research workers, of published work on the following aspects of the subject, with a useful bibliography at the end of nearly every section: varieties; harvesting, handling and mechanical injury, bibl. 73; grading, washing, and waxing, bibl. 11; vine killers, bibl. 14; precooling and transportation, bibl. 13; dormancy, bibl. 50; storage (structures and operation), bibl. 43; potatoes in storage, bibl. 31; composition and dietetic value, bibl. 17; vitamin C content, bibl. 68; cooking quality, bibl. 36; darkening of potatoes on cooking, bibl. 28; processing and by-products, bibl. 26; consumer and market preferences, bibl. 15; diseases, bibl. 145; insect damage, bibl. 28; nematodes, bibl. 18; and review papers, bibl. 16.

2881. Department of Agriculture for Scotland (Laird, R.).
Ware potatoes—early and maincrop.
Adv. Leafl. Dep. Agric. Edinb., **15**, 1950, pp. 15, 6d.

The ware potato crop in Scotland in 1948-49 amounted to 660,000 tons and exceeded local consumption, the estimated average yield being 7·2 tons per acre. The object of this leaflet is " to outline the commoner practices adopted in the production of ware crops in Scotland and to indicate the more important factors which influence success ". Brief descriptions of 21 first early, second early and maincrop varieties are appended, and acreages in 1939 and 1948 are compared.

2882. (Department of Agriculture, Dublin.)
Field experiments, 1948.
J. Dep. Agric. Dublin, 1949, **46**: 131-48.

Potato variety trials: In trials conducted at 64 centres on 3 varieties, Ulster Commerce would appear to be the most satisfactory, Kerr's Pink next, and Stormont Dawn the least. *Trials with a " hormone " selective spray for weed control:* Results of trials show that *Brassica* spp. with one possible exception, may be controlled by 0·5% 4-chloro-2-methyl phenoxyacetic acid, but for complete control a 1% concentration is desirable. Results with other weed species were somewhat erratic; 2, 3 or 4% sprays being more effective.

2883. (Dehaene, A., and Duvet, M.)
Résultats d'expérimentations faites en 1949.
(Potato trials 1949.)
Pomme de Terre franç., 1950, **13**: 126: 17-24.

Trials carried out at Armentières, Nord, concern: (1) new early varieties, (2) a comparison of Bintje seed potatoes of different origin, (3) semi-late and industrial varieties, (4) new Dutch varieties and (5) the influence of seed potato storage on yield. With reference to the last point, it was found that hampers are much superior to sacks.

2884. Monot, G.
Essais sur les variétés: Institut de Beauvais et Arran Banner. **(Trials with the potato varieties Institut de Beauvais and Arran Banner.)**
Pomme de Terre franç., 1949, **12**: 123: 4-11.

It is difficult to draw any definite conclusions from the many data obtained in different trials at various localities, but on the whole the results confirm earlier findings, viz. that with both varieties: (1) highest yields are obtained from medium-sized tubers (150 g.), though

yields from 100-, 250- or 350-g. tubers were only slightly inferior; (2) large potatoes yield a markedly higher proportion of small tubers than do plants produced from small tubers; (3) yields from 100-g. tubers cut in halves are definitely inferior. This practice is, however, not without economic interest in view of the saving in seed.

2885. DIEHL, R.
Le choix des variétés de pommes de terre. Caractères et aptitudes des différentes variétés cultivées. **(Features of the potato varieties grown in France.)**
Pomme de Terre franç., 1950, **13**: 124: 6-14.

The value of the potato varieties grown in France—of both French and foreign origin—is assessed and the following conclusions are reached: (1) There is no outstanding variety in the group of early potatoes. (2) Bintje is satisfactory in the semi-early class, but there would be no substitute if wart disease were to spread further in this variety. (3) Industrie and Ackersegen are leading in the semi-late and late category, but varieties combining blight resistance with high yields and quality are lacking. (4) The position is better in the class of industrial potatoes, but the predominance of foreign varieties is regretted. Figures are given on the tonnage of seed potatoes of 19 varieties produced in France in 1948.

2886. MONOT, G.
Observations sur les essais de variétés. **(Observations on potato variety trials [in France].)**
Pomme de Terre franç., 1950, **13**: 125: 5-11.

Points to be observed in variety trials are set out and the requirements of the French and export markets are defined. The total demand of about 400,000 tons of seed potatoes is split up for the most important varieties of all categories.

2887. JÄHNL, G.
Ergebnisse der Kartoffelversuche des Jahres 1949. **(Results of the potato trials 1949.)**
Versuchsergebn. Bundesanst. alpine Landw. Admont, 1950, Hft **4**, pp. 30.

(1) *Variety trials.* Aquila gave higher yields than any of the generally grown varieties. The results include data on diseases, flowering, size grades and starch content. (2) *Date of planting.* With Ackersegen, planting in the middle of May yielded about 25% more than planting at the end of April, while Bintje gave better results if planted at the earlier date. (3) *Cutting the seed* as against planting whole increased yield in 5 trials only. Cutting the seed after sprouting gave better results than cutting before sprouting.

2888. LA FÉDÉRATION NATIONALE DES PRODUCTEURS DE PLANTS DE POMMES DE TERRE.
La production des plants de pommes de terre en France. **(The production of seed potatoes in France.)**
[*Publ.*] *Féd. nat. Prod. Plants Pommes de Terre*, 1950, pp. 36, bibl. 48.

A survey of the seed potato industry in France, its development, organization and economic aspects, the methods of production practised and the control regulations in force. Information is given on the establishments in France where research on seed potato problems is being carried out.

2889. VAN DER MERWE, W.
The production of high-grade seed potatoes.
Fmg S. Afr., 1950, **25**: 109-13, illus.

A general account is given of progress in the raising of seed potatoes in South Africa. High-grade disease-free potatoes can be produced in certain suitable areas, especially where irrigation can be used to reduce the population of aphid vectors of virus, rigorous roguing is practised and pests such as tuber moth are controlled by spraying with DDT. Imported seed of the main variety Up-to-Date has proved to be almost 100% infected with virus X. A few virus-free tubers have, however, been found and multiplied, and these form the basis on which certified stock-seed is now being issued to approved potato growers associations.—Riet River Agric. Res. Stat.

2890. KAPOOR, S. L.
Some studies on the influence of spacing, seed piece and manuring on the yield of potato crop.
Proc. Indian Acad. Sci., Sect. B, 1950, **31**: 45-53, bibl. 7.

In an experiment at Benares Hindu University in 1945-46, repeated with very similar results in 1947-48, Darjeeling Red potatoes were subjected to the following treatments: Seed of 20 g. weight was sown whole, halved (10 g.) and quartered (5 g.). Spacing between rows was 2 feet and in rows 4 in., 8 in. and 12 in. Manure was applied at nil, at 250 maunds cow dung + 100 lb. sulphate of ammonia per acre and at double these rates. The greatest response in yield and size of potatoes was to manure, differences between the three levels being highly significant. At low levels of manuring larger seed pieces increased yields, but at high manuring differences were relatively small. 8 in. spacing gave best yields at low and medium levels of manuring, and 4 in. spacing at the higher level of manuring. Significant increases in the average size of tubers resulted from using smaller seed pieces and also from wider spacing. It is concluded that potatoes cannot be grown profitably with little or no manure, that with moderate manuring 10 g. sets should be planted 8 in. apart and that with heavy manuring sets can be reduced to 5 g. and spacing to 4 in. apart in the rows.

2891. KAPOOR, S. L.
Some economic aspects of potato cultivation.
Indian J. Hort., 1949, **6**: 2: 1-5, bibl. 1.

The cost and gross and net incomes per acre are tabulated for the treatment combinations described in abstract 2890 above for the 1947-48 season. All treatments involving no manure resulted in substantial losses. At the moderate level of manuring 6 out of 9 treatments incurred losses and only the use of 10 g. sets at 8 in. spacing in the rows showed any appreciable profit. At the high level of manuring 6 out of 9 treatments showed profits, the highest net returns coming from 5 g. sets at 4 in. and 8 in. spacing and from 10 g. sets at 8 in. spacing. [Whether or not these results will be found to apply under other environmental conditions, the attempt to apply an economic analysis to the results of a field trial is to be welcomed.—ED.]

2892. KAPOOR, S. L.
Seed factor in potato production in India.
Reprinted from *Rural India*, Oct. 1949, pp. 3.
An increase on the present potato acreage of 449,000 in India is considered essential, but seed is a limiting factor, particularly on the plains where storage losses during hot weather are heavy. The position could be improved by increasing the acreage under potatoes in the cooler hill districts, by increasing cold storage facilities in the plains, and by reducing seed rates and using more manure on the lines described in abstracts 2890 and 2891 above.

2893. KAPOOR, S. L.
The role of type of seed in the culture of potato. I. Influence of size of seed piece on growth, yield and grade of potato.
Indian J. Hort., 1950, **7**: 1: 25-9, bibl. 7, illus.
Seed tubers of variety Darjeeling Red were cut into pieces weighing 5, 10, 20, 30 and 40 g., in such a manner that each piece had two eyes. Both top and tuber growth, expressed as weight, number and average size of tubers per hill, increased with each increase in size of seed piece. The weight of tubers harvested from 40 g. pieces was double that of tubers from 5 g. pieces. [See also abstract 2890 above.]

2894. LARSEN, E. C.
Chlorophyll formation in potato tubers as affected by temperature and time.
Science, 1950, **111**: 206-7, bibl. 3, being *Res. Pap. Idaho agric. Exp. Stat.* **299.**
Chlorophyll contents were determined for White Rose potatoes kept at temperatures of 41° F., 51° F., and 66° F., and subjected to 13-19 foot-candles of light for periods from 72 to 600 hours. At 41° F. chlorophyll increased slowly throughout the experiment, and at 51° F. relatively rapidly and uniformly. At 66° F. chlorophyll increased most rapidly up to 360 hours, but thereafter remained almost constant, whereas the tubers at 51° F. continued to accumulate chlorophyll to a substantially higher level. These results suggest that chlorophyll formation in potato tubers is dependent upon both temperature and time in a manner similar to that found elsewhere for etiolated seedlings.

2895. JONES, E. W., AND HEWITT, E. J.
Experiments on iron metabolism in plants. II. The interrelationship of iron and potassium in the metabolism of the potato plant.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 49-57, bibl. 18, illus.
1. Potato plants (variety Majestic) were grown in sand culture with three levels of iron and three levels of potassium to produce deficiency, normal and luxury consumption or excess effects of each element. 2. At the lowest iron and potassium levels the plants showed marked iron deficiency chlorosis; increased potassium supply decreased the severity of the chlorosis and produced tall, vigorous, pale green plants. 3. At the lowest potassium level, plants in all iron treatments showed severe potassium deficiency symptoms. These commenced in the older leaves, appeared first in the low iron treatments and were correspondingly delayed with increase in the iron concentration of the nutrient. 4. Increased iron concentration, however, increased the ultimate severity of the potassium deficiency symptoms, which became especially marked in the young shoot regions of plants. 5. Total yield and tuber weights increased regularly with the concentration of iron and potassium in the nutrient. 6. Increased potassium supply increased the total potassium content of the leaves and the old/young leaf ratio of potassium extracted in Morgan's reagent. 7. Increased iron supply decreased the potassium content of the young leaves. The old/young ratios for extractable and total potassium content of leaves increased with increased iron supply. 8. Increase of potassium supply generally increased iron content at the higher iron levels; at the lowest iron level the iron content decreased for the young and increased for the old leaves. 9. Total phosphorus content diminished with increased supplies of either potassium or iron; calcium content decreased with increased iron supply. 10. The experimental results support the idea that iron and potassium are interrelated in the metabolism of the potato plant and the reciprocal effects of this interrelationship on iron utilization and potassium translocation are discussed. [Authors' summary.]

2896. BAKER, L. C., AND OTHERS.
The composition and cooking quality of potatoes from fertilizer trials in the East Riding of Yorkshire.
J. Sci. Fd Agric., 1950, **1**: 109-13, bibl. 10.
1. Analyses and tasting tests have been carried out on samples of potatoes from fertilizer trials on different types of soil, namely (*a*) Gladstone potatoes grown on thin wold chalk soil at Wharram and (*b*) Majestic potatoes grown on sand or warp at Howden. 2. In the trials on wold soil, which is deficient in potash, the addition of potash to the fertilizer resulted in (i) marked increases in the yields of potatoes, dry matter and nitrogen per acre, and (ii) tendencies for the tubers to show a slight increase in ash content. In one year, 1948, omission of potash resulted in potatoes which on cooking blackened badly and were glutinous in texture. [Authors' summary.]

2897. EMILSSON, B.
Potatisens kokkvalitet och gödslingen. **(The cooking quality of potatoes and manuring.)**
Växtnaringsnytt, 1950, **6**: 2: 7-9, from abstr. in *Soils and Ferts*, 1950, **13**: 1595.
A summary of experimental findings. Lack of balance between N and K spoils the taste, whereas P generally improves it. KCl should be avoided. N should be given preferably as $(NH_4)_2SO_4$. High N reduces starch content and mealiness. High N or low K or both may cause darkening on cooking.

2898. SMITH, O.
Potato production.
Adv. Agron., 1949, **1**: 353-90, from abstr. in *Soils and Ferts*, 1950, **13**: 1135.
Fertilizer practices, rotations and the effects of N, P, K, Mg, minor elements and pH are fully discussed. Information is also given on chemical weed control, disease and pest control and the relation of yield to soil composition.—Cornell Univ., Ithaca, N.Y.

2899. Cartmill, W. J.
A progress report on potato fertilizer trials.
Qd agric. J., 1950, **70**: 194-208.
A series of trials has been in progress since 1946 in the Lockyer Valley, the Fassifern Valley and the Lower Burdekin districts, to determine the NPK needs of potatoes on the main soil types. The most general responses have been to N as sulphate of ammonia; K has shown responses in a few cases and P in one only. Further trials will be needed to clarify the position.

2900. Monot, G.
Essais d'engrais sur pomme de terre. **(Manurial trials with potatoes.)**
Pomme de Terre franç., 1949, **13**: 123: 20-3.
In a series of trials carried out in Brittany it was found that under local conditions N40-P60-K200 is the most favourable composition of a potato fertilizer. The tabulated data show the effect of 5 different formulae on yield and tuber size.

2901. Pontailler, S., and Quidet, P.
À la recherche des fumures rentables pour la pomme de terre. **(The quest for economic fertilizers for potatoes.)**
Potasse, 1950, **24**: 22-4, from abstr. in *Soils and Ferts*, 1950, **13**: 1139.
The average of 132 potato harvests showed that yield was raised by 50% and 67% respectively by applications of K at medium (150-200 kg./ha.) and high (250-350 kg./ha.) rates respectively. The improvement in tuber size was even more significant.

2902. Le Pechon, J.
La fumure des pommes de terre et des choux-fleurs dans la région de Saint-Malo. **(Fertilizing potatoes and cauliflowers in the St. Malo district.)**
Potasse, 1950, **24**: 47-9, from abstr. in *Soils and Ferts*, 1950, **13**: 1661.
The importance of balanced quantities of lime, N, P and K for potatoes and cauliflowers is discussed. K fertilizers, particularly when placed in potato furrows, should be free from NaCl impurity. The most suitable K fertilizer for cauliflowers is normally K_2SO_4, but when they follow a heavy potato crop KNO_3 is advised, also P in the form of $CaHPO_4$. Formulae for complete fertilizers are suggested for use under different conditions of cultivation.

2903. Tamman, A. I., and Žukova, G. S.
Granulated superphosphate under potatoes. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 5, pp. 52-5.
Results of fertilizer trials from 3 different parts of Russia are presented. While the results due to conditions and treatment varied considerably, it can be said that applications of small amounts of granulated superphosphate in the rows at planting increased yields and were equal in action to double amounts of ordinary superphosphate.

2904. Reuckiĭ, F. V.
Summer planting of potatoes. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 5, pp. 47-51, illus.
Results of tests on summer planting for raising seed potatoes, carried out at the Mitnofanovsk experimental field, Voronež region, are described and summarized in numerous tables. Various factors were studied including the effect of fertilizers, sprouting, cutting of tubers, varieties. In all cases summer plantings gave better results than spring planting.

2905. Odland, T. E., and Allbritten, H. G.
Soil reaction and calcium supply as factors influencing the yield of potatoes and the occurrence of scab.
Agron. J., 1950, **42**: 269-75, bibl. 9.
Results are reported from 2 experiments on the influence of soil reaction and additions of calcium with the fertilizer on yield of potatoes and the occurrence of scab. Soil reaction was regulated by the use of hydrated lime or sulphur, calcium was added at the rates of 100 and 200 lb. per acre of CaO equivalent in the form of limestone or as gypsum. Under the condition of the 2 tests potato yield was little influenced by soil reaction between 4·8 and 6·1; reactions below or above those had a definite tendency to reduce yields. The addition of small amounts of calcium with the fertilizer had little influence on yield or scab occurrence. A soil reaction of pH 5·0 to 5·5 seems advisable in order to obtain the best yields of potatoes with the least scab. [From authors' summary.]—Agricultural Experiment Station, Kingston, Rhode Island.

2906. National Institute of Agricultural Engineering.
Packman potato planter.*
Rep. nat. Inst. agric. Engng **RT 14/49023,** 1949, pp. 4+Appendices.
The Packman planter, fitted with narrow shares in front of the planting units, gave satisfactory spacing on level and sloping ground with both commercial Scotch and evenly graded seed. Experienced operators should plant at an average rate of 120 potatoes per feeder per minute. During the test, on 27-inch drills and with 15-inch spacing, a net rate of working of 1·4 acres per hour was obtained. The over-all rate of working would be 20-30% less than this because of the time taken to fill the hopper on the headland. It is suggested that: (1) The hopper and feeding tray should be designed so that an extra man is not required to push the potatoes from the hopper on to the feeding tray. (2) Baffles should be provided to prevent loss of potatoes at the sides of the forward edge of the feeding tray on wide rows. (3) The covering bodies should be staggered. [Report's conclusions.]

2907. National Institute of Agricultural Engineering.
The Scarcliffe 2-row potato planter.†
Rep. nat. Inst. agric. Engng **RT 26/50018,** 1950, pp. 7+Appendices, illus.
The Scarcliffe potato planter is of simple design and is well constructed, and it can be easily attached to a tractor toolbar. All the main adjustments provided are adequate for normal requirements and they are easy to make. During the planting of a total of 26·4 acres in three fields, each operator was able to maintain a planting rate of 80-90 potatoes per minute, and the

* Manufactured by Modern Designs Ltd., Twyford, Berks.

† Manufactured by R. Chambers, Esq., Main Street, Scarcliffe, near Chesterfield.

over-all rate of working was from 0·5 to 0·7 acres per hour. The spacing of the potatoes in the row was considered to be good, and the lateral stagger of potatoes in the row was negligible. When planting in the ridges of previously ridged land, the joins between bouts were accurate, but when planting " from the flat " the joins were approximately 2 inches narrower than the nominal row width. The depth of planting was affected by the quantity of potatoes in the hopper, the maximum variation in the depth of planting being 2·5 inches. Several minor modifications, including provision for the attachment of the toolbar stabilizing fin, are suggested. [Report's conclusions.] The manufacturer states that all the improvements suggested in the report have now been incorporated in the standard models manufactured and sold by them.

2908. National Institute of Agricultural Engineering.
Angus single-row potato digger.*
Rep. nat. Inst. agric. Engng **RT 18/49067,** 1950, pp. 8.

1. The general performance of the machine was satisfactory, and comparable in quality to that of other machines of the same type. 2. The V-belt drives were efficient. 3. On sandy soil, the useful life of a front web was about 40 acres. The rear web was still usable after 86 acres, although the drive sprockets were nearly worn out. 4. The front cones were still usable when removed, the first pair after 35 acres and the second after 51 acres. 5. The rollers and agitators were still serviceable after 86 acres. 6. There appeared to be little difference in wearing qualities between British- and American-made cones, bearings, and links. [Report's conclusions.] The manufacturers state that the British-made links of the elevator web on the machine submitted for test were not uniformly hardened, and those which broke during the test were probably over-hardened. The manufacturers consider that the hardening of the links now being used is satisfactory and that the links are as good as those of American manufacture.

2909. Wenzl, H.
Zur Frage des nichtvirösen Kartoffelabbaues. **(Potato degeneration of non-virus origin.)**
Bodenkultur, 1950, **4**: 152-60, bibl. 8, illus.

Potato degeneration of non-virus origin is apparent in the eastern, hot and dry area of Austria. The symptoms are hair sprouting [feeble, thread-like sprouts], stunted growth and a reduced number of shoots. The considerable difference between virus resistance of individual varieties and the degree of degeneration also points to the existence of a non-virus degeneration. The trouble, which seems to be connected with *Colletotrichum* wilt, caused a progressive reduction in yield.

2910. Münster, J.
Lutte préventive contre les viroses de la pomme de terre. **(Preventive control of potato viruses.)**
Rev. romande Agric. Vitic., 1950, **6**: 49-51.

In trials carried out in 1949, DNC and sodium chlorate were found to kill the haulms of the Bintje potato variety sufficiently quickly to reduce the spread of virus diseases, though not to the same extent as pulling up the haulms. With Erdgold—as with Ackersegen the year before—chemical haulm destruction increased the percentage of virus infection above that of the controls as these varieties form young shoots after the treatment, thus offering an ideal settling ground for aphids. Both chemicals tested were shown to persist in the soil and to have a detrimental effect on the succeeding crop (barley).—Seed control research station, Mont-Calme, Lausanne.

2911. Münster, J.
Efficacité de quelques méthodes de récolte des plants de pommes de terre (récolte hâtive) entravant la propagation des maladies á virus et du mildiou. **(The effect of different harvesting methods on the spread of virus diseases and blight in potatoes.)**
Rev. romande Agric. Vitic., 1950, **6**: 25-7.

On 20 July, i.e. 98 days after planting, the following treatments were applied to three potato varieties grown for seed: (1) " Immediate " harvesting, (2) cutting the haulms and (3) pulling up the haulms. Method (3) proved to be most effective in checking the spread of virus diseases, but the labour required is excessive. With the varieties Bintje and Ackersegen haulm cutting was almost as good as " immediate " harvesting, but not so with Erdgold, where the plants treated according to method (2) had a higher virus percentage than the controls harvested on 17 September. In 1947 and 1948 chemical haulm destruction was as effective as cutting, but the 1949 figures are not yet available. Tubers harvested " immediately " lost about 20% in weight during the first month of storage, while those left in the ground gained weight for 3-4 weeks after removal of haulms. After 5-6 weeks in the ground the weight was about the same as that of the tubers harvested " immediately ". In 1948, a blight year, it was shown that " immediate " harvest results in a high percentage of infection. It was found safest to leave the tubers in the ground for 4-6 weeks after haulm destruction. It is also noted that chemical haulm destruction suppresses weed growth.—Seed control research station, Mont-Calme, Lausanne.

2912. Šip, V.
Snižování výnosu bramborů virosami. **(Loss in potato yields through virus.)** [English summary ½ p.]
Ochr. Rost., 1949, **22**: 38-44, bibl. 3, illus.

Figures are given for loss in potato yields in Czechoslovakia for 1942-48 due to leaf roll, streak (rugose mosaic) and crinkle, and some observations are made on precautionary practice.

2913. Fischer, R.
Viruskrankheiten und Grösse der Saatknolle. **(Virus diseases and size of seed tuber.)**
Bodenkultur, 1950, **4**: 161-5.

Experiments carried out under the auspices of the Austrian Institute for Plant Protection on the variety Alma lead to the following conclusions: (1) The percentage of virus-diseased tubers increases with the percentage of virus-diseased mother plants, especially when the infection of the mother plants is mild.

* Manufactured by L.O. Tractors Ltd., Coupar Angus, Perthshire.

(2) The smaller the seed tubers, the greater the probability that they originate from virus-diseased plants. (3) When using seed material of the usual size (80 to 120 g.) mild virus diseases are likely to be promoted more readily than severe ones; with smaller tubers this difference disappears.

2914. KLOSTERMEYER, E. C.
The phloroglucinol test for diagnosis of leaf roll in Netted Gem potatoes.
Plant Dis. Reptr, 1950, **34**: 36-8, bibl. 3.
The use of the phloroglucinol test on the apical portion of the plants makes possible the determination of leaf roll increase as the season progresses, since frequent sampling can be made without destroying the plant.

2915. BAERECKE, M.-L.
Erfahrungen mit *Physalis floridana* Rydb. und *Physalis angulata* L. als Testpflanze für das Blattrollvirus der Kartoffel. (***Physalis floridana* and *P. angulata* as test plants for leaf roll virus of potato.**)
Züchter, 1950, **20**: 99-102, bibl. 4, illus.
Physalis floridana and *P. angulata* show, in accordance with data given by American authors, strong and clear symptoms of leaf roll infection, including necrosis in the phloem. Small seedlings of *P. floridana* used for testing leaf roll virus show recognizable symptoms within 8-10 days. The method of testing is described. [Author's summary.]

2916. DAVIDSON, T. R.
Phloem necrosis of potato tubers in relation to leaf-roll-free *Myzus persicae* Sulz.
Canad. J. Res., Sect. C, 1950, **28**: 283-7, bibl. 14, being *Contr. Sci. Serv. Dep. Agric., Ottawa*, **1016.**
In experiments in which non-viruliferous colonies (25 to 50 individuals per plant) of *Myzus persicae* Sulz. were caged from 7 to 10 days on healthy potato vines growing under field conditions, the tubers failed to develop phloem necrosis. Under comparable conditions, the tubers from healthy plants caged with leaf-roll-infective colonies of this vector developed severe phloem necrosis. When planted, these tubers produced leaf-roll-infected plants. [Author's abstract.]

2917. ROLAND, G.
Étude préliminaire sur les variantes du virus X (*Solanum virus I*, Orton). (**A preliminary study on strains of virus X.**) [Dutch summary 7 lines.]
Parasitica, 1950, **6**: 51-62, bibl. 12, illus.
Seven strains of the virus were studied, by grafting, on *Nicotiana tabacum*, *N. glutinosa*, *Capsicum annuum* and *Solanum tuberosum* (var. King Edward). The results showed that stem grafting the virus on to immune potato varieties is more accurate than grafting on to other plant species for the identification of the important variants of potato virus X.

2918. STAPP, C., AND BARTELS, R.
Der serologische Nachweis des X-virus in Dunkelkeimen der Kartoffelknolle. (**The serological proof of virus-X in sprouts of potato tubers sprouted in the dark.**)
Züchter, 1950, **20**: 42-6, bibl. 10.
The serological proof of virus in sprouts, germinated in the dark, of virus-X infected potatoes depends on the season in which the tubers sprout and the sprouting temperature. Sprouting at 21° C., which must not be exceeded, was found optimum for the identification of virus-X infected tubers by the leaf method. The best time is mid- to late winter, sprouting taking 1 month. This procedure takes up less room than the eye sprouting and test plant method and gives quick results. Sprouts should be taken from all parts of the potato and juice extracted from the basal parts of sprouts exceeding 10 cm. in length.—Biologische Zentralanstalt, Braunschweig.

2919. ROSS, A. F.
Unrelatedness of potato virus Y and cucumber mosaic virus.
Phytopathology, 1950, **40**: 445-52, bibl. 22, illus.
Reciprocal cross-protection tests on *Physalis floridana* showed that potato virus Y is not closely related to cucumber mosaic virus.—Cornell.

2920. MCKAY, R.
The susceptibility of some potato varieties to common scab (*Actinomyces scabies* (Thaxt.) Güssow) in different soils.
Sci. Proc. Roy. Soc. Dublin, 1949, **25**: 6: 65-84, from abstr. in *Soils and Ferts*, 1950, **13**: 674.
From 1941 to 1946, 65 varieties were grown at 4 locations in plots treated annually with scabbed peelings and farmyard manure. The fertility status of the soils was fairly uniform, but their pH ranged from 5·2 to 7·9. Scab development in heavy soils was favoured by high rainfall. Only the light, gravelly plot showed any increase in scab due to continued cropping with potatoes, although lack of rotation increased the amount of black scurf (*Corticium solani*), powdery scab (*Spongospora subterranea*) and silver scurf (*Spondylocladium atrovirens*) in some or all of the heavy soils.

2921. ATKINSON, R. G., AND ROVATT, J. W.
The effect of the incorporation of certain cover crops on the microflora of potato-scab-infested soil.
Abstr. in *Proc. Canad. phytopath. Soc.*, 1949, **16**: 15, from abstr. in *Soils and Ferts*, 1950, **13**: 271.
The addition of soybean crops to soil infested with *Actinomyces scabies* reduced the disease and increased soil acidity.

2922. JERMOLJEV, E., AND SETHOFER, V.
Zkušenosti nabyté při zjišťování vzdornosti brambor k aktinomykose. (**Results incidental to selection of scab resistant potatoes.**) [Russian summary ¾ p.]
Ochr. Rost., 1949, **22**: 204-25, illus.
Eight different strains of *Actinomyces* have been isolated and investigated in different places in Czechoslovakia. It was found that individual strains affected different varieties of potatoes in varying degree. Strain virulence is influenced by local conditions of soil, climate, etc. A combined laboratory/field method of ascertaining potato resistance to actinomycetes gives promising results. The strains tested showed no antagonism to azotobacteria.

2923. Sethofer, V., and Král, C. J.
Závislost aktinomykosní strupovitosti brambor na poměrech pudních. (**The influence of soil conditions on *Actinomyces* scab of potatoes.**) [Russian summary 1 p.]
Ochr. Rost., 1949, **22**: 86-105, bibl. 12.

It was observed that *Actinomyces* scab occurs where soil conditions are unsuitable for *Spongospora* and azotobacteria. Tests on 109 soil samples from various parts of Bohemia indicated it was possible to reduce the effect of, and even inactivate, *Actinomyces* in suitable soils by correct organic manuring, the addition of lime ($CaCO_3$) up to 0·06% and such cultivation as aids the azotobacteria and inhibits the anaerobic microflora.

2924. Vielwerth, V.
Příspěvek ke studiu vzniku různých forem strupovitosti obecné na bramborech. (**The forms of common scab of potatoes.**) [English and Russian summaries ½ p. each.]
Ochr. Rost., 1949, **22**: 28-37, bibl. 9, illus.

Organic manuring was found to reduce the incidence of 2 types (deep and swollen) of common scab found in Czechoslovakia, while increasing that of a third one (flat). It is suggested that each form is produced by a different strain of *Actinomyces*. Soil reaction was found to have no influence on the disease, but some reagent in humus acting differentially on actinomycetes is stipulated.

2925. Moraes, A. de M.
Uma bacteriose vascular de batateira (*Bacterium solanacearum*, E. F. Smith). (**A vascular bacteriosis of potato.**) [English summary 1 p.]
Agron. lusit., 1947, **9**: 277-328, bibl. 85, illus. [received 1950].

This disease has extended so rapidly in Portugal since 1939 that practically no potato region in the country is considered free from it. In some regions potato growing is no longer economic. The symptoms are similar to those caused by *Bacterium solanacearum* except that no brown discoloration of stem tissues has been observed. Suggestions are made for its control.

2926. Lansade, M.
Flétrissement bactérien et comportement des variétés de pommes de terre. (**The susceptibility of potato varieties to bacterial ring rot.**)
Pomme de Terre franç., 1950, **13**: 132: 9-11, bibl. 17.

In inoculation experiments practically all the varieties tested were found to be susceptible to *Corynebacterium sepedonicum*, so that they are liable to contract bacterial ring rot on cutting the seed. Generally, a smaller degree of susceptibility was shown by early varieties with a short growing season. The late variety Furore seems to be resistant.—Inst. National de la Recherche Agronomique.

2927. Foister, C. E., and Wilson, A. R.
Dry rot of potatoes.
Agriculture, Lond., 1950, **57**: 229-33, bibl. 7.

Recent co-operative work, some hitherto unpublished, by the Agricultural Research Council and the Department of Agriculture for Scotland is reviewed. Over 90% of dry rot is caused by *Fusarium caeruleum*. Varieties differ in susceptibility, most early varieties being very liable to infection, but susceptibility increases as the season advances and during subsequent storage, reaching a maximum in early spring. Damage in handling, particularly in machine riddling and during storage, is the main factor determining the extent of infection. Apart from care in handling, the disease can be controlled by dusting the tubers at lifting with 3% tetrachlornitrobenzene (Fusarex) and keeping them for at least 4 weeks in a closed environment such as a clamp, to allow the compound to volatilize. Other precautions which may assist in reducing the disease are indicated.

2928. Ministry of Agriculture, London.
Dry rot of potatoes.
Adv. Leafl. N.A.A.S. Lond. **218**, 1950, pp. 5, 1d.

An account of dry rot of potatoes caused by several species of *Fusarium*, the most important being *F. caeruleum*, with notes on the susceptibility of varieties and measures of control.

2929. Hedou, —.
Réflexions sur la fusariose. (**Dry rot of potatoes.**)
Pomme de Terre franç., 1950, **13**: 130: 17-21.

In some years dry rot (*Fusarium caeruleum*) causes severe losses of stored potatoes in France. As a result of his observations the author comes to the conclusion that infection is most likely to occur after de-sprouting, which calls for strict precautions. Disinfection and other sanitary measures are recommended for the prevention of the disease. From a purely theoretical point of view, however—i.e. not taking economic considerations into account—cold storage seems to offer ideal control, as has been found in several trials.

2930. Sethofer, V., and Jermoljev, E.
K otázce vzdornosti bramborových odrůd proti rhizoctonii (*Rh. solani*). (**Rhizoctonia resistance of potato varieties.**) [Russian summary 1¼ p.]
Ochr. Rost., 1950, **23**: 89-106, bibl. 13, illus.

From black scurf diseased potatoes (from Moravia and Slovakia) 8 forms of *Rhizoctonia solani* were isolated. These forms vary in activity, and attack the individual varieties of potatoes with varying intensity. During extensive tests no potato variety was found to be resistant to *Rhizoctonia solani*. The earlier sprouting varieties showed lower susceptibility to attack.

2931. Monot, G., and Bedouet, J.
Essais de traitement du rhizoctone. (**The control of stem canker in potato.**)
Pomme de Terre franç., 1950, **13**: 124: 22-3.

Small-scale trials confirmed the previous year's results [see *H.A.*, 19: 2260] that the treatment of seed tubers with organic mercury compounds (1% not to be exceeded) and formaldehyde reduces stem canker incidence.

2932. Vielwerth, V.
O spongosporové strupovitosti bramborů. (**Powdery scab of potatoes.**) [English summary ½ p.]
Ochr. Rost., 1949, **22**: 77-86, bibl. 6, illus.

Powdery scab (*Spongospora subterranea*) occurs in Czechoslovakia only in the moister, cooler and higher areas, but has not been shown to vary with differences in soils. As the lesions are mainly superficial the disease is of little economic importance. During a 5-year trial, out of 30 home-bred varieties, 10 have been selected as particularly scab-resistant.

2933. Goidànich, G., and Pettinari, C.
Indagini su una alterazione di incerta natura del tubero di patata. **(Investigation of a phenomenon of uncertain nature in potato tubers.)** [English summary ½ p.]
Ann. Sper. agrar., 1950, **4** (N.S.): 95-101, bibl. 5.

A discussion of a phenomenon previously thought to be a symptom of *Spongospora subterranea*. It consists of roundish or triangular to quadrangular lesions which penetrate by a tube a few mm. long to the flesh. This tube has a uniform periderm. The surrounding starchy parenchyma is rusty brown. In the discoloured tissues there are spherical bodies, reticulated and vacuolated; the vacuoles gradually change into small globules. Research continues to determine the cause of the lesions and the physiological significance of the spherical bodies.

2934. Hooker, W. J., Sass, J. E., and Kent, G. C.
Stem necrosis of potatoes caused by *Streptomyces scabies*.
Phytopathology, 1950, **40**: 464-76, bibl. 10, illus.

Symptoms of *Streptomyces scabies* on potato stems appeared as cortical necrosis, tan to light brown and merging gradually into the unaffected tissue. Of the lower stem lesions, present as potatoes approached maturity, about 15 to 20% were estimated to be caused by *S. scabies* in Iowa potato fields, and in certain fields the figure was much higher.—Agric. Exp. Stat., Ames, Iowa.

2935. Jørstad, I.
Melding om potetkreften (*Synchytrium endobioticum*) i Norge for årene 1939-1945. **(A report on wart disease of potatoes in Norway for the period 1939-45.)**
Meld. Stat. Plantev. (*Stat. plantepatol. Inst.*) **2**, 1946, pp. 34 [received 1950].

Statistics on the spread of potato wart disease in Norway with a map illustrating its present distribution. The regulations governing quarantine measures are set out and the incidence of secondary infection after quarantine is recorded. The disease was on the increase at the time of publication.

2936. Zakopal, J.
Příspěvek k methodice zkoušení nových křiženců bramborových na vzdornost k rakovině. **(A method of testing new potato varieties for resistance to wart disease.)** [English and Russian summaries ¾ p. each.]
Ochr. Rost., 1950, **23**: 106-15, bibl. 4, illus.

A method of testing new potato varieties against wart disease (*Synchytrium endobioticum*) on an experimental field of the Institute for Plant Protection, Brno, Czechoslovakia, is described. Soil and climatic conditions are very favourable to wart disease and care is taken to keep up the sporangia population of the fungus in the soil. Every sixth tuber planted in the row is of a non-resistant variety as check, Wohltman proving the best of the three varieties used for that purpose.

2937. Zakopal, J.
Výsledky zkoušky na vzdornost k rakovině bramborů u některých odrůd ze světového sortimentu. **(Potato wart disease resistance.)** [English summary ½ p.]
Ochr. Rost., 1949, **22**: 60-3.

The results of trials on resistance to potato wart disease (*Synchytrium endobioticum*) carried out at the Research Institute for Plant Protection, Brno, Czechoslovakia, are given.

2938. Müller, K. O.
Affinity and reactivity of angiosperms to *Phytophthora infestans*.
Nature, 1950, **166**: 392-5, bibl. 12.

This is a very condensed discussion of the conception the author has formed on the nature of *Phytophthora* resistance in *W* potato varieties and in angiosperms in general.—Nat. Inst. agric. Bot., Cambridge.

2939. Cook, H. T., and Lutz, J. M.
Relation of rainfall to time of development of potato late blight in the field and to the importance of tuber rot in storage.
Plant Dis. Reptr, 1950, **34**: 15-18, bibl. 2.

The data indicate that tuber rot from late blight is unlikely to be important in storage in seasons in which blight occurs early and is followed by dry weather during the late part of the growing season and at harvest time.

2940. Ortega, R.
Variedades de papas resistentes a la "candelilla" (*Phytophthora infestans*) adaptas a los Andes Venezolanos. **(Blight-resistant potato varieties adapted to conditions in the Venezuelan Andes.)**
Agric. venezol., 1950, **13**: 139: 43-5, illus.

An account is given of the potato breeding work that has been carried out at the Experimental Institute of Agriculture, El Valle, Venezuela, since 1942, to produce varieties that are resistant to *Phytophthora infestans* and can be grown in the tropical regions of the Andes. Varieties of *S. demissum* and *S. andigenum* were used as parents. Of the resistant hybrids tested at Timotes in the Andes, 4 varieties (Glenmeer, Chama, Timotes and Motatan) proved to be very heavy croppers, yielding considerably more than the varieties usually grown in the district. At the end of the third year's trial, Glenmeer became slightly infected with blight, but the other 3 remained perfectly healthy.

2941. Müller, K. O.
Hypersensitivity and tumour development in potato tubers in response to infections with *Phytophthora infestans*.
Nature, 1950, **166**: 231-2, bibl. 2.

F_2 forms of a certain potato cross were found to produce tumours on cut tuber surfaces which had been inoculated with parabiontic strains of *P. infestans*. It is thought that this mode of reaction is linked with

hypersensitivity to the parasite.—Nat. Inst. agric. Bot., Cambridge.

2942. KAMMERMANN, N.
Vad gör potatisbladmögelsvampen under sommaren ? **(Summer behaviour of the potato blight fungus.)**
Växtskyddsnotiser, 1949, No. 4, pp. 5-8.
In an experimental field of the Swedish plant protection station blight occurred in early July in the potato variety Early Puritan. The attack was remarkable for several reasons: It appeared unusually early, it was localized in a few hundred square metres, while the rest of the field did not show any visible symptoms, and it was confined almost exclusively to the stalks. The area of infection roughly coincided with a patch where hail damage had been severe. Inoculation experiments showed that sporangium formation is much more abundant in artificially inflicted wounds than in other places on the stalk, probably because the moisture of the wound constitutes a favourable condition. Further it was found in another series of inoculation experiments that the leaves are more resistant before blooming than afterwards. These observations account (1) for the early outbreak on the stalks in this particular case and (2) for the long latent phase of the fungus in the potato plant in general.

2943. BRÉTIGNIÈRE, —.
Essais de traitement du mildiou de la pomme de terre. **(An experiment on the control of potato late blight.)**
C.R. Acad. Agric. Fr., 1948, Tome **34**, No. 17, from abstr. in *Rev. Agric. Brux.*, 1949, **2**: 402-3,
The effectiveness of various concentrations of copper sprays and dusts, and the value of dithiocarbamate for control of potato late blight were investigated at the Central Station for Plant Pathology, Versailles, in 1948. The variety Bintje was used, and one application of each treatment was given 14 days before the blight became widespread. Copper sprays containing 500 g. copper per hl. (applied at the rate of 1,200 l. per ha.) were greatly superior to those of lower concentrations. Copper oxide and copper oxychloride sprays gave less effective control than bordeaux mixture, and more frequent spraying would be required. Copper dusts (15-20%) can be recommended for complementary treatments. Thiocarbamates gave poor control and had little persistence.

2944. SMALL, T., DUNN, E., AND THOMAS, G. E.
Potato root eelworm in Jersey.
Agriculture, Lond., 1950, **57**: 212-15, bibl. 4.
A note on the spread of *H. rostochiensis* first reported in Jersey in 1938, in potato and tomato soils. In trials with D-D fumigation, started in 1946, potato yields have been increased but without any corresponding reduction in eelworm population, and tainting of the produce has occurred unless 5 months elapsed between treatment and planting. With tomatoes results have been more promising, especially where soil was treated two years in succession. In 1949 the estimated cost, using one hand injector, two men, and 540 lb. D-D, was £48 per acre.

2945. REYNARD, —.
Le nématode doré de la pomme de terre. **(The golden nematode of potatoes.)**
Pomme de Terre franç., 1950, **13**: 130: 10-15, bibl. 2, illus.
The biology of *Heterodera rostochiensis* and the symptoms caused are discussed. The incidence of this nematode has not been reported in France, but an official survey is to be carried out. Control measures as practised in Holland are outlined.

2946. OOSTENBRINK, M.
Het aardappelaaltje (*Heterodera rostochiensis* Wollenweber), een gevaarlijke parasiet vor eenzijdige aardappel-cultuur. **(Potato eelworm a dangerous parasite in intensive potato culture.)** [English summary 9½ pp.]
Meded. PlZiekt. Dienst **115**, 1950, pp. 230, bibl. 213, illus.
A detailed account of the eelworm and the disease it causes with reference to (1) historical review, (2) the genus *Heterodera*, (3) biology, (4) host plants, (5) origin, (6) symptoms of disease, (7) the potato-sickness problem, (8) control, (9) danger of potato sickness and measures to be taken against it.

2947. KVÍČALA, B. A.
Nejdůležitější mšice na bramborách. **(Aphids on potatoes.)** [English summary 4 lines.]
Ochr. Rost., 1949, **22**: 44-54, bibl. 5, illus.
A description of the most important aphids attacking potatoes, with an identification key.—Plant Protection Research Institute, Brno, Czechoslovakia.

2948. VÖLK, J., AND HAUSCHILD, I.
Abhängigkeit des Blattlausbefalls von der Kartoffelsorte (Vorläufige Mitteilung). **(The influence of potato variety on green aphid attack. Preliminary communication.)**
NachrBl. dtsch. PflSchDienst. Braunschweig, 1950, **2**: 74-5.
Counts were made of *Myzus persicae* from 14 June to 2 August, 1949, at the Celle Virus Research Station, Germany, on 8 [early to late] potato varieties. The aphid attack varied considerably, but as the count was made when most insects were in the larval stage, the differences are more likely to be due to conditions favourable to larval development than to varietal influence on flights.

2949. GIMINGHAM, C. T.
Colorado beetle problem.
Research, Lond., 1950, **3**: 310-14, bibl. 48.
A brief review of the work that has been done on the Colorado beetle problem. The chief lines of investigation dealt with are (1) studies of the biology and ecology of the insect; (2) studies of the food plants, and attempts to breed resistant varieties of potato; (3) the role of natural enemies in control; and (4) field and laboratory studies of direct control measures.

2950. DIRECTIE VAN DE LANDBOUW.
De Coloradokever (*Leptinotarsa decemlineata* Say.). **(The Colorado beetle.)**
Meded. PlZiekt. Dienst **68**, 1950, pp. 18, illus.
Descriptions of the stages of development of the

Colorado beetle, its habits and infestation, host plants, distribution, damage caused, biological control and control by insecticides.

2951. SENDLER, O.
Beitrag zu dem Vordringen des Kartoffelkäfers in Thüringen. **(The spread of Colorado beetle in Thuringia.)**
NachrBl. dtsch. PflSchDienst Berlin, 1950, **4**: 17-22, bibl. 8.
Maps, tables and a chart accompany this article on the spread of the Colorado beetle.

2952. HUBERT, K.
Achtet auf das Bilsenkraut, eine weitere Wirtspflanze für den gefährlichen Kartoffelkäfer ! **(Henbane, another host for Colorado beetle.)**
NachrBl. dtsch. PflSchDienst Berlin, 1950, **4**: 136.
Numerous Colorado beetle larvae were found on henbane (*Hyoscyamus niger* L.) in a weedy beet field in eastern Germany.

2953. B., R.
La lutte contre le doryphore. **(Colorado beetle control.)**
Pomme de Terre franç., 1950, **13**: 125: 15-21.
Dealing briefly with the position in certain western and central European countries and more fully with the organization of control measures in France, the latter being illustrated by a map.

2954. BLATTNÝ, C., SLABÝ, V., AND NEUBAUER, S.
Základy boje proti mandelince bramborové (*Leptinotarsa decemlineata*) Say. **(Control of Colorado beetle on potatoes.)** [French and Russian summaries.]
Ochr. Rost., 1950, **23**: 136-58.
The morphology of the Colorado beetle is given. A disease of the beetle called " brown disease " by the author and probably of virus origin is described and is stated to produce 92% mortality. Other biological controls are considered. The most satisfactory control was found to be dusting with Gesarol at the rate of 22 lb. per acre in the spring and 35 lb. per acre later. 2% Gesarol spray is also recommended. After Gesarol, Karsol S was next best, followed by hexachlorocyclohexane. Pyrethrum was unsatisfactory. In experiments on soil disinfection, carbon bisulphide at the rate of 100-150 c.c. to the square metre was found the most satisfactory. This work at the hop research station, Žatec, Czechoslovakia, is being continued.

2955. SCHEIBE, K.
Versuche zur Herabsetzung der Spritzbrühmengen bei der Kartoffelkäferbekämpfung. **(Trials to reduce the amount of spray mixture applied in the control of Colorado beetles.)**
NachrBl. dtsch. PflSchDienst. Braunschweig, 1950, **2**: 117-19.
Field and laboratory trials showed that 200 litres of spray mixture per hectare are as effective as 400 or 600 litres, provided the amounts of active substance applied are the same in all cases. DDT 50 (1·5 kg. per hectare) proved superior to other DDT preparations, calcium arsenate, BHC and E838 in respect of both Colorado beetle control in the field and residual action as evaluated in the laboratory.—Inst. Colorado beetle research, Darmstadt.

2956. GRISON, P.
Les traitements aériens contre le doryphore. **(Colorado beetle control from the air.)**
Pomme de Terre franç., 1950, **13**: 130: 5-9, being *Bull. tech. Inf. Ingén. Serv. agric.* **46.**
These " first observations " evaluate the success of a large-scale trial, involving two types of helicopter and an aeroplane, which was carried out in the plain of Calais by the International Committee for Colorado Beetle Control in June, 1949. Although the actual rate of destruction was the same for all treatments, viz. about 60% of the adult beetles, spraying a DDT emulsion from a Sikorski helicopter gave a better distribution of the insecticide and had a better residual effect than applying a DDT dust from a Bell helicopter or an aeroplane. The cost of the operation may be justifiable where the protection of a not yet infected area is sought, but it is not considered economical in France where the treatment has to be followed up by further measures against the larvae. Correct timing of the operation is of vital importance.

2957. BRENY, R.
L'action des ennemis naturels indigènes sur le doryphore en Europe. **(The action of native natural enemies of the Colorado beetle in Europe.)** [English summary 9 lines.]
Parasitica, 1950, **6**: 23-36.
In reviewing the principal native natural enemies of the Colorado beetle the author concludes that its biological control by bacteria, fungi, vertebrates and arthropods is, and for a long time will remain, insufficient, unaided to oppose its multiplication.

2958. EICHLER, W., AND MÜLLER, H. J.
Erdflohschäden in Sachsen-Anhalt (1948). **(Flea beetle damage in Sachsen-Anhalt [Germany] in 1948.)**
NachrBl. dtsch. PflSchDienst Berlin, 1949, **3**: 15-19, bibl. 7.
The crops discussed include potato on which *Psylliodes affinis* caused heavy damage.

2959. BRIMBLECOMBE, A. R.
The protection of stored potatoes against the potato tuber moth, *Gnorimoschema operculella* Zell. Part 1. Trials in southern Queensland.
CANNON, R. C.
Part 2. Trials in northern Queensland.
Qd J. agric. Sci., 1950, **6**: 77-86, bibl. 1.
In a southern Queensland trial conducted in 1943-44 it was established that derris dust (1% rotenone) gave almost complete protection against tuber moth damage and was satisfactory for use on both seed and table potatoes. Ground magnesite was satisfactory for the treatment of seed potatoes. Pyridine (5% dust) was somewhat less effective, and " Hortosan D.P." (an organic mercurial fungicide) was useless for the purpose.
Northern Queensland trials in 1946 and 1947 showed derris dust (1% rotenone), magnesite and DDT (2% dust) to be effective in protecting stored potatoes, and

ferric oxide to be relatively ineffective. [Authors' summary.]

2960. Arnason, A. P., Fox, W. B., and Glen, R.
A preliminary test of DDT and benzene hexachloride for the control of wireworms in a Saskatchewan potato field.
Canad. Ent., 1948, **79**: 174-80, from abstr. in *Soils and Ferts*, 1950, **13**: 1090.
Field plots of silty loam infested with wireworms were treated with (1) 20 and 100 lb./acre of DDT in April and (2) 25 lb./acre of BHC powder containing 20% of crude BHC, equivalent to 2·5% of γ-isomer in May. The insecticides were ploughed in to a depth of 7-8 inches. In October the percentage reductions in wireworm population were 89 for BHC, 63 for 100 lb. of DDT and 23 for 20 lb. of DDT. Adults were not found in the BHC plot, but were as numerous in the DDT plots as in the controls. Numbers of larvae surviving in BHC soil the following June were only sufficient to cause slight damage to potatoes, but those surviving DDT were numerous. Because of the danger of tainting, BHC should be applied 2-3 years before potatoes are planted and crop rotation including summer fallow and cereals is suggested. Once wireworms are eliminated they will not increase sufficiently in 3 years to cause serious damage.

2961. Bonnemaison, L., and Missonnier, J.
Traitement du sol contre les larves de taupins. **(Soil treatment against wireworms.)**
Pomme de Terre franç., 1950, **13**: 126: 11-13, bibl. 3.
The data show that benzene hexachloride has a greater efficacy against wireworm of potato than several other soil insecticides tested, 10-12 kg. of the active substance per hectare giving a control of 90-98%. It was found immaterial whether the chemical was applied as a dust or as a spray, provided the dosage was the same. In view of the effect on flavour the treatment should be applied in the autumn preceding the planting of the potato crop.—Station Centrale de Zoologie Agricole.

2962. Mitchener, A. V.
A comparison of recent insecticides with calcium arsenate for control of potato insects.
J. econ. Ent., 1950, **43**: 176-8, bibl. 1.
Results of experiments at the Manitoba University Farm indicate that DDT was the best of the insecticides used against Colorado beetle, *Leptinotarsa decemlineata*, and the only one which gave satisfactory control of the potato leafhopper, *Empoasca fabae*. Dieldrin gave excellent control of both Colorado beetle larvae and adults, aldrin of larvae only. Results with the potato flea beetle and aphids were inconclusive.

2963. Schwartz, E.
Zur Geschmacksbeeinflussung der Kartoffel durch die Behandlung mit Hexa-Prapäraten. **(The effect of hexa-preparations on the flavour of potatoes.)**
NachrBl. dtsch. PflSchDienst Berlin, 1950, **4**: 101-5, bibl. 4.
Existing hexa-preparations impart an unpleasant flavour to potatoes, rendering them sometimes inedible. New "practically odourless and tasteless" preparations have been tested at the Colorado Beetle Research Station, Mühlhausen, Thüringen, but though they show improvement as regards flavour, they are not so highly insecticidal as the old types.

2964. Steele, W. G.
A useful machine for spraying potatoes.
Qd agric. J., 1950, **70**: 92-3, illus.
A cheap and simple horse-drawn machine is described for applying DDT to control the potato tuber moth. Mounted on two wheels, the machine consists of a 44-gal. drum, from which a tube leads to a brass rotary pump that is rotated by a gear wheel fitted to one of the land wheels. Spraying 4 rows at a time a maximum rate of 50 gal. per acre can be applied.

2965. Turner, N.
Counteracting the effect of benzene hexachloride on flavour of potatoes.
J. econ. Ent., 1950, **43**: 109.
Activated charcoal at the rate of 1 ton to the acre of benzene hexachloride-treated soil removed the off-flavour of potatoes almost completely. Hydrated lime at 5 tons per acre was almost as effective. While neither treatment, at the rates used, was completely practical, their effectiveness does indicate that practical corrective treatments can be developed to remove this persistent insecticide from the soil.—Connecticut Agricultural Experiment Station.

2966. Barker, J.
The ascorbic acid content of potato tubers. I. The relation between ascorbic acid and the sugar content, as influenced by the maturity at lifting and by storage.
New Phytol., 1950, **49**: 11-22.
The ascorbic acid content of King Edward VII potato tubers increased to a maximum and then decreased during growth and development on the plant. The loss of ascorbic acid in storage at 10° C. was more rapid in immaturely lifted potatoes than in those dug when the haulm was dead.—Low Temperature Research Station, Univ. of Cambridge.

2967. Cmora, N. Ja.
On storing seed potatoes. [Russian.]
Doklady vsesojuz. Akad. seljsk. Nauk S.S.S.R., 1950, No. 4, pp. 29-30.
It was found that the removal of the etiolated sprouts from seed potatoes reduced the resulting crop by 4·6 to 17·8%.

2968. Hedou, J.
Conservation des plants en frigorifiques par la coopérative "Union Morbihannaise". **(Cold storage of seed potatoes.)**
Pomme de Terre franç., 1949, **12**: 122: 22-9.
In trials carried out at St. Nazaire by a co-operative enterprise during the winter of 1948/49, cold storage of seed potatoes of the variety Bintje was found to be "very desirable". Best results, viz. an increase in yield of 14·5% in one case, were obtained at a constant temperature of +1·5 to +2° C. The tubers should be placed in crates of 25-35 kg. to facilitate penetration of the cold air which must be kept in constant circulation for the control of humidity. After removal from

cold storage sprouting is somewhat slow (2-3 weeks), and the ordinary pre-sprouting treatment must be applied before planting.

2969. (Bonifacio, —., and Lambert, C.)
Construction et aménagement de chambres climatisées. **(Construction and equipment of cold storage chambers [for seed potato storage].)**
Pomme de Terre franç., 1950, **13**: 128: 13-18.
Specifications are given for construction and equipment of cold storage chambers, but it is noted that their use for seed potato storage is still in the experimental stage. The optimum temperature and relative humidity are 3° C. and 80% respectively. The potatoes are transferred to the chamber soon after harvest and removed 2-3 weeks before planting. They are stored in complete darkness which allows of the best use of the available space. [The article is a comprehensive extract of a study by the authors. It is not stated whether or where the full paper is being published.]

2970. Anon.
Quelques remarques faites par des particuliers sur la conservation du plant au cours de la campagne 1949-50. **(Trials on the storage of seed potatoes 1949-50.)**
Pomme de Terre franç., 1950, **13**: 130: 15-16.
In storage trials with seed potatoes of different origin the following among other conclusions were reached: (1) If the method of cold storage is used, the tubers should be moved to the chamber in October and not in December or January [see *H.A.*, 20: 894]. (2) Potatoes grown on a heavy soil seem to keep better than those grown on light or humic soils. (3) Cold storage does not appear to be economic for ware potatoes.

2971. Burton, W. G.
Studies on the dormancy and sprouting of potatoes. I. The oxygen content of the potato tuber.
New Phytol., 1950, **49**: 121-34, bibl. 21.
There was no marked change in the oxygen content of potato tubers during storage; this suggests that oxygen concentration *per se* plays no part in the onset or, under ordinary conditions of storage, termination of dormancy.—Low Temperature Research Station, Cambridge Univ.

2972. Hemberg, T.
The effect of glutathione on the growth-inhibiting substances in resting potato tubers.
Physiol. Plant., 1950, **3**: 17-21, bibl. 7.
It is evident from experiments that glutathione treatment of resting potatoes causes the disappearance of growth-inhibiting substances from the tubers. The fact that an ethylenechlorhydrin treatment has the same effect [*H.A.*, 19: 3202] is therefore undoubtedly due to the subsequent increase of the glutathione content in the potato. The disappearance of growth-inhibiting substances towards the end of the rest-period of potatoes that have broken their rest by natural means can thus be attributed to the increase, observed by Emilsson [*H.A.*, 19: 2215], in the glutathione content in the potatoes towards the termination of that period.—Stockholm University.

2973. Tombesi, L.
Respirazione e attività ossidasica e catalasica durante i processi di cicatrizzazione su tuberi sani e tuberi malati di *Solanum tuberosum*. **(Respiration and activity of oxidase and catalase during callusing of sound potato tubers and of those infected with *Penicillium* sp.)** [English summary ½ p.]
Ann. Sper. agrar., 1949, **3** (N.S.): 1227-50, bibl. 10.
In these experiments at the Stazione Chimico-Agraria Sperimentale at Rome it was found that, whereas maximum respiratory intensity occurred in healthy half tubers 24 hours after cutting, the increase in infected cut tubers was considerable, showing different maxima. Washing the cut surface lowered the katabolic activity, probably owing to the removal of hormones. Respiration and oxidase content were directly proportional during normal healing. Catalase increase was inverse to that of oxidase. A constant factor K of enzymatic inactivation has been calculated for each curve.

Mushrooms.

(*See also* 3411.)

2974. Borzini, G.
Ricerche sullo "*Psalliota campestris*" Fr. e notizie sulla fungicoltura in Italia. **(Investigations on *Psalliota campestris* and notes on mushroom growing in Italy.)**
Suppl. Atti Ist. bot. Lab. critt. Pavia, 1949, Ser. 5, Vol. E, pp. 26, bibl. 41.
A review of the literature covers taxonomic, genetical and physiological aspects of *Psalliota campestris*, the production of spawn and the normal methods of preparing mushroom beds, with a short note on parasites. The author notes that modern methods have not been generally used in Italy and he proposes a research programme which would result in the sorting out of the different races of *Psalliota*, a determination of the best casing material including the use of artificial composts, of the best methods of reproducing the fungus and of pasteurizing the media used.

2975. Borzini, G.
Ricerche sperimentali sulle terre usate in Italia per il ricoprimento dei "letti" di coltura di *Psalliota* spp. **(Investigations on the casing soil used for mushrooms in Italy.)** [English summary ½ p.]
Reprinted from *Ann. Sper. agrar.*, 1949, **3** (N.S.): 1111-24, bibl. 2.
Biological tests of potential productivity of casing soils confirmed the conclusion of Pizer and Leaver on the existence in the soil of substances which promote cropping. Negative results were obtained using washed siliceous sand, heated at 370° C. Heat sterilization of casing soils may lower their potential productivity. A preliminary, biological test of casing soil is useful using a race of *Psalliota* which has a low tendency to the production of sporophores when not in direct contact with the soil. The factors promoting the formation of rhizomorphs are not necessarily the

same as those promoting the formation of fruiting bodies. The soils hitherto used for casing in Italy are classified according to their capacity for promoting the different phases of mushroom growth.

2976. Atkins, F. C.
Mushroom composting processes.
Reprinted from *Nurseryman and Seedsman*, 1947, pp. 15, illus. [received 1950].

The author deals largely with the composting process in which horse manure is the all-important ingredient. He does, however, devote 2 pages to the future in which synthetic composts seem certain to be even more important, briefly but usefully discussing pioneer work of Repin, Middlebrook, Lambert, and especially Stoller, though he does not go into any detail in this connexion. [Artificial composting is now under investigation at Yaxley.]

2977. Atkins, F. C.
The tray system in Great Britain.
Publ. Mushroom Gr. Ass. Yaxley, 1950, pp. 15, illus., 2s. 6d.

The tray system of growing mushrooms is described and the advantages and disadvantages pointed out. There is a saving of compost per square foot of bed area of one-third (4 in. as opposed to 6 in.) and five crops per annum are possible from each growing room compared with 2½ from shelf houses, but the cost of trays is higher than that of shelving; exceptional care must be taken in watering and ventilating, and bacterial diseases are frequent.

2978. Atkins, F. C.
Major diseases and competitors of the cultivated white mushroom.
Publ. Mushroom Gr. Ass. Yaxley, 1949, pp. 23, illus., 5s.

This brochure comprises the following sections: Disease caused by bacteria (bacterial pit, bacterial spot, bacterial blotch, brown blotch); disease caused by *Dactylium dendroides* (mildew, cobweb, soft decay); antagonism from *Fusarium* spp. (damping off, wilt); mummy disease; compost disease caused by *Myceliophthora* spp. (verdigris and mat disease); disease caused by *Mycogone perniciosa* (bubble); competition from *Papulaspora byssina* (brown plaster mould, brown plaster); competition from *Pseudobalsamia microspora* (truffle, false truffle, calves' brains); competition from *Scopulariopsis fimicola* (white plaster mould, white plaster); and disease caused by *Verticillium* spp. (brown spot, fungus spot, dry bubble).

2979. Thomas, C. A.
Animal pests of mushrooms.
Progr. Rep. Pa agric. Exp. Stat. **33**, 1950, being 1 folded picture sheet 18×22 in.

The author illustrates and gives notes on eelworms, five types of mite, springtails, sciara flies, phorid flies and cecidomyid flies and the damage caused by them to mushrooms.

2980. Mushroom Growers' Association.
Insecticides: data for the mushroom grower.
Leafl. Mushroom Gr. Ass. Yaxley, 1949, pp. 8, 2s. 6d.

A leaflet of manufacturers' recommendations compiled by the Insecticides Committee of the Mushroom Growers' Association, Yaxley, Peterborough.

Hops.

(*See also* 3431, 3444.)

2981. Wilson, D. J.
Observations on the development and anatomy of hop layers.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 76-9, bibl. 2, illus.

The development of layered hop stems throughout a growing season was studied and their internal structure was examined. Some of the stages are shown in photomicrographs. The layer develops much phloem and ray tissue and a store of starch. A preliminary study of stem behaviour under the influence of darkness, moisture, position and soil is also described.

2982. Golubinskiĭ, I. N.
Peculiarities of rooting in hop cuttings. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1948, **60**: 1065-7, bibl. 2 [received 1950].

In experiments with hop cuttings, each with 2 nodes, taken from the underground runners, it was found that the removal of the shoots as they develop promotes rooting from the lower side of the cuttings.

2983. Burgess, A. H.
Hop manuring and cultivation experiments.
A.R. Wye Coll. Dep. Hop Res. for 1949, 1950, pp. 18-33.

Details are given of combined manurial and cultivation experiments on hops, carried out between 1930 and 1948. During the first seven years inorganic and organic nitrogenous manures produced no significant differences in yield, but later secondary effects caused the yields from the inorganic manured plots to fall below those receiving organic manures. Varying the amount of sulphate of ammonia with an extreme variation of 40 lb. N per acre gave significant differences in some years. The cultivation experiments on the time of cessation of deep cultivation and on autumn ploughing showed no significant differences in yield of hops. There was no indication that differences in either manurial or cultivation treatments influenced the incidence of mosaic.

2984. Thompson, F. C., Cripps, E. G., and Burgess, A. H.
The effect of soil acidity on growth of hops. Some observations on manganese toxicity and induced iron deficiency.
A.R. Wye Coll. Dep. Hop Res. for 1949, 1950, pp. 43-7, bibl. 7.

Manganese toxicity can be one factor affecting the growth of hops on certain acid soils on the High Weald of Kent. The uptake of manganese may be so high that an induced iron deficiency develops as the result of ion antagonism. One symptom associated with high leaf manganese is the occurrence of pale leaves with necrotic speckling between the veins in spots which tend to coalesce and form a blotchy scorch. The speckling has been seen particularly on young plants; on established hops irregular dead areas occur on the leaves. It appears that manganese toxicity symptoms in the hop plant are quite distinct from, and not necessarily associated with, those of iron deficiency.

2985. Thompson, F. C., Cripps, E. G., and Burgess, A. H.
Experiments on magnesium deficiency in the hop plant. Progress report I.
A.R. Wye Coll. Dep. Hop Res. for 1949, 1950, pp. 34-42, bibl. 3.

Magnesium deficiency can occur in hops on neutral or alkaline soil where the level of available magnesium is moderately high. The symptoms of potassium-induced magnesium deficiency on such soils are different from those found in hops growing under acid conditions where both leaf magnesium and available magnesium in the soil have been low. In the former the chief symptom is a leaf chlorosis, leaf scorch being mostly absent; on acid soils a severe marginal and interveinal scorch develops and it may appear relatively early in the season. Potassium-induced magnesium deficiency has been controlled by applying magnesium sulphate (as Epsom salts) to the soil and omitting potash fertilizers.

2986. Fišer, F.
Hmelj žetve 1946 god. **(Hop harvest 1946.)** [*Publ.*] *Inst. agric. Tech. agric. For. Fac. Univ. Zagreb*, 1947, pp. 18, bibl. 6 [received 1950].

The booklet deals mainly with the evaluation of hops grown in Yugoslavia in 1946, summarizing in tables which show in parallel columns an old and new system of evaluation. Hops are grown in the Sevinje Valley in northern Jugoslavia at 240-800 m. above sea level; picking started in mid-August; average yield was 910 kg. per ha.; drying was done at 40-50° C. without the use of sulphur. Notes are given on certain acreages and total yields between 1941 and 1946.

2987. Blattný, C., and Osvald, C. V.
Předběžný přehled viros chmele a boj proti nim. **(Preliminary survey of hop viruses and their control.)** [French summary 3 pp.]
Ochr. Rost., 1949, **22**: 5-28, bibl. 21, illus.

In the last 2 years the number of viruses on hop in Czechoslovakia reached 25, plus 3 virus-like conditions. Descriptions are given. None of the known viruses immunizes the hop against any other, but plants suffering from the nettlehead type complex are less liable to peronospora [mildew] than mosaic diseased plants. Infection through the seed is possible with 2 of the Czech viruses. The majority of viruses can be transmitted by sap on the cutting knife. Among insects *Chlorita flavescens* and others are hop virus vectors. Some viruses remain viable in the soil 1-2 years, some up to 6 years [a complex of viruses similar to nettlehead], others cannot survive in soil. The usual control measures are suggested.

2988. Blattný, C., and Osvald, C. V.
Abnormální forma peronospory chmelové. **(An abnormal form of hop downy mildew.)** [French summary 4 lines.]
Ochr. Rost., 1949, **22**: 58-60, illus.

An abnormal form of *Pseudoperonospora humuli* found on a single hop plant in the neighbourhood of Ustek, Czechoslovakia, is described.

2989. Cook, A. H., and Harris, G.
The chemistry of hop constituents. Part I. Humulinone, a new constituent of hops.
J. chem. Soc. Lond., 1950, pp. 1873-6.

Humulinone is a newly discovered constituent of the petroleum-soluble hop resins. Its antibacterial activity is not comparable to that of lupulone, humulone or *iso*-humulone.—Brewing Industry Res. Foundation, Nutfield, Surrey.

2990. Branton, C. I.
A hop drier for Oregon farms.
Stat. Bull. Ore. agric. Exp. Stat. **474,** 1950, pp. 6, illus.

Most of the hop farming in Oregon, accounting for over one-quarter of U.S. hop production and nearly one-eighth of the world's total, is done on a small scale and the hops are dried artificially. The requirements of a drier capable of drying hops without loss of quality are: Drying temperature around 150° F.; adequate air circulation, provision for loading the kiln to the depth of 36 inches and provision for sulphur burning. Size and type of drier and kiln area must suit individual requirements. A design, based on tests and observations by the Department of Agricultural Engineering, is described in this leaflet, including very detailed ground and elevation plans.

2991. Fišer, F.
Sušenje i starenje Savinjskog hmelja. **(Drying and aging of Sevinje hops.)** [*Publ.*] *Inst. agric. Tech. agric. For. Fac. Univ. Zagreb*, 1948, pp. 31, bibl. 30 [received 1950].

This booklet consists of 2 parts: (1) drying and (2) aging of hops. Successful drying experiments were concluded at Žalec, Northern Yugoslavia, in 1947 in an electric kiln by higher temperatures (80° C.) than is customary in that country. The colour and lustre of cones, aroma and general appearance remained as high as in hops dried at lower temperatures. Extensive tables and charts illustrate the effect of aging on hops, to which the Sevinje hops are said to stand up better than hops grown elsewhere.

2992. Bitenc, F.
Primjena sušenja infracrvenim zrakama u poljoprivredi. **(The use of infra red rays for drying agricultural products.)**
Zbornik Društva [*Bull. Stud. Ass. Zagreb, nat. Sci. Sect.*] Zagreb, 1949, **1**: 84-95, bibl. 4.

Various methods of drying are mentioned. The action of infra-red rays and their employment in drying agricultural products, particularly hops, kale and spinach, and maize are described. The economic advantages of drying hops by infra-red rays over hot air drying, and details of procedure as given by Fišer [see below] are quoted. Possible improvements, such as temperature control and more even distribution of infra-red rays, are considered. Kale is dried by infra-red rays in less than half the time taken by hot air, resulting in better colouring, no blanching, preservation of vitamins and appearance. Spinach was also dried more quickly than by the conventional method.

2993. Fišer, F.
Orijentacioni pokusi sušenja hmelja infra-crvenim zrakama. **(Hop drying experiments with infra-red rays.)**
[*Publ.*] *Inst. agric. Tech. agric. For. Fac. Univ. Zagreb*, 1949, pp. 32, bibl. 3.
A description is given of a small electric drying machine with 2 mobile drying baskets, built at the Zagreb University. The distance between the upper layer of hops and the infra-red lamp, fitted in the ceiling of the machine, is 132 cm., maximum temperature 52° C. Temperature in the lower basket, where the drying is initiated, is 28° C. No difference was found between the chemical composition of hops dried by infra-red rays and those dried by hot air, though the colour of the hot air dried hops was better. The cost and time of drying were halved by infra-red ray drying.

Tobacco.

(*See also* 2728, 3198, 3200, 3428, 3429.)

2994. Morris, J. W.
Tobacco.
Proc. 37th annu. Mtg Okla Acad. Sci. for 1948, 1950, pp. 133-5.
General hints on the cultivation of tobacco in the U.S., from whence it was first exported 330 years ago.—University of Oklahoma, Norman.

2995. Gutierrez, M. E.
Virginia tobacco culture.
Philipp. J. Agric., 1949, **14**: 275-85, illus.
General recommendations are given as to varieties, suitable districts and soils, raising seedlings, transplanting, manuring, seed selection, harvesting, stringing and poling, and flue-curing barns. A barn is described with the aid of ground and elevation plans.

2996. Central Tobacco Research Station, Rustenburg.
Hints on the production of Virginia tobacco.
Fmg S. Afr., 1950, **25**: 128-30.
Recommendations are made on varieties, manuring, rotations and the control of insect pests. At Rustenburg efforts are being made to develop Orinoco tobacco types suited to local conditions to replace Amarelo and Ehlers, which are virtually the only types grown in the Union for flue-curing, but are of inferior quality for export.

2997. Tyrrell, V. D., and Wheeler, T. S.
An analytical comparison of Irish and American tobaccos.
J. Dep. Agric. Dublin, 1949, **46**: 86-98, bibl. 13.
Summarized preliminary conclusions are: (1) Irish tobacco has, compared with American tobacco, a high content in ash, CaO, Cl, S, and N, which have a deleterious influence on its quality. (2) To reduce the ash and CaO contents, tobacco should be grown on non-calcareous soils and the amount of calcium fertilizer applied should be controlled. (3) The use of farmyard manure should be restricted and, if used, it should be ploughed in rather than placed in drills. [From authors' conclusions.]

2998. Fraser, R. H.
Report on tobacco production in Mauritius.
Rev. agric. Maurice, 1950, **29**: 17-27.
In a report based on a visit to Mauritius the author discusses soils, field practices, research, administration of the industry and manufacture and consumption. He pays particular attention to the question of quality, the local Amarello type producing very high yields but of a flavour unsuitable for export. Attempts to breed varieties with comparable yields, but without the unpleasant flavour, have so far proved unsuccessful, and this method does not seem promising. A superior strain of Amarello said to have been produced in South Africa should be imported for trial, and further experiments should be made with air-cured Burley tobacco for possible export to Africa.

2999. González, L. A. B.
Almácigos de tabaco. **(Tobacco nurseries.)**
Agric. venezol., 1949, **13**: 136: 32-4, illus.
Experiments to determine the best quantity of tobacco seed to use per sq. m. of seedbed, and the effect of rate of sowing on the size, weight and development of the plants are reported. The experimental seedbeds were on poor, gravelly soil but were well manured and irrigated; seed was sown at the rates of 10, 15 and 20 g. per sq. m. The lowest rate of sowing yielded more and better developed plants in the first 4 pullings. The highest rate of sowing yielded the greatest total number of plants, but the average weight per hundred was lower and many were unusable.

3000. Perucci, E.
I semenzai di tabacco. **(Tobacco seedbeds.)**
Tabacco, 1950, **54**: 24-33.
A detailed account of the composition and care of tobacco seedbeds formed in wooden frames sunk in the ground with a drainage layer at the bottom, and hotbed above; above this again is sand containing fertilizer and finally a top layer of sterilized mould or peat. The whole is provided with a gauze cover used to preserve the heat.

3001. Flosdorf, E. W., and Palmer, A. W.
Annual variation in nicotine content of tobacco.
Science, 1949, **110**: 715-16, bibl. 1.
Analyses made over 4 seasons of tobacco grown near Lancaster, Pa, showed a definite trend towards higher total alkaloid content in dry seasons. Within any one year the effect of rainfall was somewhat greater towards the end of the growing season. In samples from different farms over 90% showed a variation of not more than $\pm 10\%$ from the average for the year, but in a few cases tobaccos were encountered with as little as half, or as much as 50% above, the average. No relation was found between pH and alkaloid content.

3002. Ferrer, L. G.
A review of experiments and investigational work on filler tobacco.
Philipp. J. agric., 1949, **14**: 257-65, bibl. 17.
Investigations carried out by the Bureau of Agriculture during the past 20 years are reviewed, and the relevant literature cited. The work covered includes variety

trials, breeding, cultural trials, physiological investigations, curing experiments and studies of production costs.

3003. Perucci, E.
Gli ibridi di prima generazione. **(First cross hybrids of tobacco.)**
Tabacco, 1950, **54**: 43-54, 158-70, 204-7, 235-40, bibl. 6, illus.

A discussion of the literature is followed by practical considerations. The danger is stressed of using excessive quantities of pollen when cross-pollinating, since this leads to the production of large capsules but small, weak seeds. The first cross hybrid seed is of high vigour and its plants develop quickly and mature early, which means economy in curing. The interval between curing and fermentation is also shortened—again an advantage. Other advantages due to rapid growth are: the hybrids are less subject to insect attack owing to their quick resumption of growth after transplanting, they need less hoeing, they are in less danger (1) from drought and (2) from hail [in late summer], they can succeed a grain crop, they are less subject to bacterial and virus attacks. Technical details are given of the cross pollination operation, and preliminary preparation for it and certain difficulties with *N. rustica* are pointed out. The life of tobacco pollen grains is discussed. Although trial shows that they can effectively pollinate up to 15 days, the recommendation is made that pollen should not be used later than the 6th or 7th day from dehiscence of the anthers, i.e. the 7th or 8th day after they have been picked for the purpose. A further recommendation based on trial is that the pollen should be applied to flowers 1 to 2 days after they have been emasculated.

3004. Poljakov, I. M., and Mihaïlova, P. V.
The effect of the age of pistil and pollen on selective fertilization in tobacco and mahorka. [Russian.]
Izv. Akad. Nauk S.S.S.R. Ser. biol., 1950, No. 1, pp. 42-63, bibl. 22.

The work of previous workers is reviewed. The experiments here described were with 10 varieties of *Nicotiana tabacum* and 6 of *N. rustica*, using pistils of 3 different ages and pollen in 5 combinations when 2 days and 12 days old. The results tabulated show pronounced differences in pollen selection with age of pistils and pollen. Generally the selectivity of the mature pistils was different from that of the immature and of the old pistils.

3005. Martino, C.
L'influenza della durata del ciclo vegetativo sul tenore in nicotina in *N. rustica*. **(The effect of the length of growing period on nicotine content in *N. rustica*.)**
Tabacco, 1950, **54**: 62-4.

In experiments with the Brasile variety of *N. rustica* the author found a steadily increasing percentage of nicotine present in succeeding samples of leaves of 3 different size grades harvested 146, 149, 153, 161, 170 and 175 days after sowing. The plants were treated normally throughout their growth. The actual percentages determined were 4·02, 4·86, 5·57, 7·19, 7·74 and 9·48 respectively and concerned an average of 575 leaves on each occasion.

3006. Larose, E., and Legros, R.
Étude de l'influence de la fumure et de certains procédés culturaux sur le rendement et la qualité des tabacs belges. **(A study of the effect of fertilizers and some cultural practices on yield and quality of Belgian tobacco.)** [English and German summaries ⅓ p. each.]
Rev. Agric. Brux., 1950, **3**: 702-21.

Pot culture experiments were conducted at the Experimental Station for Plant Improvement, Gembloux, on the effect of various fertilizer treatments on the yield and quality of Gembloux Line 06 tobacco. Some of the results obtained were later confirmed by field experiments. The following results are recorded. Nitrogen had the greatest effect on yield, increased applications, up to a certain point (9 g. N per pot applied as nitrate of soda), resulting in progressively increased yields. This was achieved, however, at the expense of quality. Nitrates were preferable to other forms of nitrogen and one basic dressing was preferable to several dressings throughout the season. Potassium had little effect on yield but increased combustibility. Excessive amounts of phosphate (more than 1 g. P_2O_5 per pot) were prejudicial to yield. Abundant irrigation improved both yield and quality, as did close spacing. For this variety, spacing of 45×50 cm. is recommended. Topping is shown to be a less reliable way of controlling yield and quality than the intelligent use of fertilizers, but on fertile soils, late, high topping may be beneficial.

3007. Curcio, M.
Tabacchi levantini chiari e concimazione potassica. **(Bright leaved tobacco and potash manuring.)**
Tabacco, 1950, **54**: 96-8.

Since the almost universal demand is for bright leaved tobacco and a much higher price is obtained for it, the use of increased potassic manuring is urged. Such manuring results in a lighter coloured product showing better combustibility, and a shorter growing period allowing curing to take place before the autumn rains.

3008. Swanback, T. R.
Granite stone meal as a source of potash for tobacco.
Bull. Conn. agric. Exp. Stat. **536**, 1950, pp. 14, bibl. 6.

Studies and field trials covering 3 years are described on the use of a stone meal from granite quarries containing an unusually high proportion of potash. Two tons stone meal per acre combined with the usual amounts of N and P produced as good a yield and quality as a standard 6-3-6 fertilizer. Despite a slightly lower K content in leaf tissue, better "burn" and lighter ash colour were obtained from the plants receiving stone meal. The meal also contained traces of many minor elements and with B, Cu and Zn this was reflected in increased contents in the leaves as revealed by spectrographical analyses.

3009. Volodarskiĭ, N. I.
The effect of nitrogen nutrition on the growth of tobacco leaves. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1948, **60**: 845-6, bibl. 8 [received 1950].

Results indicate that nitrogen has a significant effect on the rapidity, dynamics, and distribution of the growth processes in tobacco leaves and that further detailed study is necessary of the effect of nitrogen on the growth processes of the leaves in the ontogeny of tobacco.

3010. SWANBACK, T. R.
Copper in tobacco production.
Bull. Conn. agric. Exp. Stat. **535**, 1950, pp. 11, bibl. 6.

In trials over three years in Connecticut with Havana seed tobacco growing in a mineral soil, copper sulphate was added to 3,400 lb. 6-3-6 fertilizer per acre at rates ranging from 18 to 72 lb. At 18 to 20 lb. per acre $CuSO_4$ increased crop values by 13 to 26%, without retarding the fire-holding capacity (burn) of the tobacco. No absorbable copper was formed, because analyses invariably showed a lower Cu content in the leaves of tobacco grown with $CuSO_4$ than in control plants. The leaf contents of K, Ca, Mg, P, Mn, Fe, Al, Zn, Na and B, determined spectrographically, were not altered appreciably by the applications. It is therefore concluded that the $CuSO_4$ applied to the soil acted as a soil amendment. Within the range of 18 to 27 lb. nitrification appeared to be stimulated, but apart from this it is possible that the $CuSO_4$ had a " neutralizing " effect on injurious compounds or even a fungicidal effect. Further studies will be needed to determine this, and in the meantime growers are recommended to apply $CuSO_4$ to tobacco at 20 lb. per acre but to check the status of active Cu in the soil periodically.

3011. STEINBERG, R. A., BOWLING, J. D., AND MCMURTREY, J. E., Jr.
A possible explanation of symptom formation in tobacco with frenching and mineral deficiencies.
Science, 1949, **110**: 714-15, bibl. 4.

Frenching of tobacco was induced in water-culture by 20 p.p.m. DL-isoleucine, and in partially sterilized soil by larger quantities of the amino acid. In mildly frenched plants growing in the field, free amino acids in leaf laminae were found to have increased to a maximum of 121% above normal. In leaf laminae of plants showing symptoms of mineral deficiencies, free amino acids were found to have increased by amounts up to the following: deficiency of N 32%, P 48%, K 587%, Ca 120%, Mg 283% and B 27%.—Bur. Plant Ind., Beltsville, Md.

3012. STEINBERG, R. A., BOWLING, J. D., AND MCMURTREY, J. E., Jr.
Accumulation of free amino acids as a chemical basis for morphological symptoms in tobacco manifesting frenching and mineral deficiency symptoms.
Plant Physiol., 1950, **25**: 279-88, bibl. 18.

Frenching was accompanied by a marked increase in isoleucine and other free amino acids in the leaf lamina of field plants of Maryland Medium Broadleaf tobacco. The assumption that the rise in free amino acids in frenching was the primary cause or mechanism of symptom production in the plant was also supported by the analytical data on field plants showing mineral deficiencies. Sharp increases in free amino acids accompanied calcium, magnesium, potassium and phosphorus deficiency, but not nitrogen deficiency. Boron and particularly sulphur deficiencies were too slight to give definite chemical difference in tissues. It is probable that calcium, magnesium, potassium, phosphorus and perhaps boron function in amino acid and protein metabolism of the plant. Chloroses due to mineral deficiencies, excepting possibly magnesium and nitrogen, are attributed primarily to the direct toxic action of excessive accumulations of metabolites. [Authors' summary.]—Plant Industry Station, Beltsville, Md.

3013. ANITIA, N.
The influence of soil moisture on the production and quality of tobacco.
Rev. int. Tabacs, 1949, **24**: 133-6, from abstr. in *Soils and Ferts*, 1950, **13**: 693.

Studies are reported on the influence of soil moisture on yields of tobacco, its characteristics, including its anatomy, its industrial quality and chemical composition. On less humid soils (25% saturation with water) the tobacco develops leaves with 1·7 to 3·8 times higher nicotine contents than on humid soils (about 100% saturation). For the 2 tobacco types studied, the resins of the leaves reach a maximum at a soil moisture of 41%. The carbohydrates increase and the proteins decrease with increasing moisture content of the soil.

3014. HOROWITZ, B.
Inhibition of axillary growth in *Nicotiana rustica* plants by chemicals.
J. Aust. Inst. agric. Sci., 1949, **15**: 128-30, bibl. 5.

In a field test near Cleveland, Queensland, plants of *N. rustica* which had first been topped and de-suckered were subjected to treatment with 6 chemicals rubbed into the cut surfaces, the effects of these treatments being compared with control plants, including plants that were topped only and plants that were neither topped nor de-suckered. Some inhibition of axillary growth followed the application of 2,4,5-T and the sodium salt and butyl ester of 2,4-D. This resulted in a lower weight of fresh and dry suckers and in a lower percentage of suckers in total plant weight. There was no adverse effect on leaf and stalk growth, except from the butyl ester of 2,4-D, and no apparent lowering of the nicotine content.

3015. GIGANTE, R.
La maculatura concentrica delle foglie di tabacco. **(Concentric spotting of tobacco leaves.)** [English summary 12 lines.]
Ann. Sper. agrar., 1949, **3** (N.S.): 1251-61, bibl. 4.

Observations are recorded on a non-parasitic disease noted on Maryland tobacco leaves at the Stazione di Patologia Vegetale at Rome. The symptoms are dark brown, round spots composed of necrotic tissue. The phenomenon, which may be identical with blackfire, is caused by excessive soil moisture and is favoured by excess of nitrogenous fertilization and by deficiency of potassium and phosphorus.

3016. HOPKINS, J. C. F.
Mosaic " scorch " in tobacco.
Rhod. agric. J., 1950, **47**: 102-5, bibl. 2, illus.

Investigations have shown that "scorching" or "burning" of the lower leaves of tobacco, which has been prevalent in Rhodesia during the last three years of drought, is confined to plants infected with mosaic virus. Drought-affected but virus-free plants do not "scorch" severely, nor do plants growing with adequate rainfall. In plants infected at topping, "scorching" may precede the appearance of mottling on the younger leaves. Control measures include frequent washing of the hands and avoiding their contamination with infected material, the use of workmen who do not smoke or take snuff for work that involves handling the plants, the elimination of weeds from seedbeds before planting to reduce hand weeding, and the roguing of mosaic plants about a month after they are planted out in the field.

3017. Ryžkov, V. L., Smirnova, V. A., and Gorodskaja, O. S.
The effect of certain stains on the virus nucleoproteid of tobacco mosaic. [Russian.]
Biohimija (Biochemistry), 1950, **15**: 222-9, bibl. 14.

Data show the inactivating effect of various stains used in microscopy. The basic stains were generally more effective than the acid.

3018. Hill, A. V., and Helson, G. A.
Distribution in Australia of three virus diseases and of their common vector *Orosius argentatus* (Evans).
J. Aust. Inst. agric. Sci., 1949, **15**: 160-1, bibl. 7, map.

The virus diseases are yellow dwarf of tobacco, virescence or big-bud of tomato, and witches' broom of lucerne. The former name of the jassid vector was *Thamnotettix argentata* Evans.—C.S.I.R.O.

3019. Gupta, B. M., and Price, W. C.
Production of plant virus inhibitors by fungi.
Phytopathology, 1950, **40**: 642-52, bibl. 17.

Filtrates of 49 species of fungi were tested for the presence of materials that would inhibit infection with southern bean mosaic, tobacco mosaic or tobacco necrosis viruses. It was found that 84% of the fungi tested produce such inhibitory agents, but less than 25% were capable of reducing infectivity as much as 80%. Studies on the growth products of two fungi *Trichothecium roseum* and *Neurospora sitophila* are described in some detail; both caused a 90% or greater reduction in infectivity, but this infectivity was restored by simple dilution. It was found that the agent present in the filtrate of *T. roseum* was not destroyed by heat, which indicates that it is not a protein.—University of Pittsburgh.

3020. Koch, L. W., and Stover, R. H.
Recent field tests on the effect of soil fumigants upon brown rootrot of tobacco in Ontario.
Sci. Agric., 1950, **30**: 256-60, bibl. 4, illus.

1. Six soil fumigants were applied to tobacco brown rootrot field soil and their relative effects on burley tobacco were compared. 2. Chemicals were applied in the row at different rates with a hand injector 10 days before planting. 3. Extremely wide differences in root injury and green weight yields were obtained between treated and non-treated plots of the susceptible variety Harrow Velvet. 4. The soil fumigants apparently acted as nematicides in the present experiments. 5. It is indicated that the variety Green Briar is much more tolerant to nematode populations in brown rootrot soil than most other varieties grown in Ontario. 6. Of the various fumigants used, Dow N, Chloropicrin, and Dow W40 resulted in greatly increased growth of the susceptible variety Harrow Velvet and thus appear to offer particular promise for the control of brown rootrot of tobacco. [Authors' summary.]—Dominion Laboratory of Plant Pathology, Harrow, Ontario.

3021. Townes, H.
Tobacco insect control in North Carolina.
Ext. Circ. N.C. agric. Exp. Stat. **351**, 1950, pp. 7, illus.

Precautions in using insecticides, particularly parathion and TEPP, are set out. Tables giving treatments for insects (1) of tobacco plant beds, (2) on newly set tobacco plants and (3) of larger tobacco plants, show the poison used, the formula and dose per acre, with remarks.

3022. Curcio, M.
Ultrasuoni e onde ultra-corte nella lotta contro gli insetti dannosi al tabacco. **(Ultrasonic waves and ultra-short rays for the control of tobacco insects.)**
Tabacco, 1950, **54**: 14-23.

In a few brief notes the author indicates how ultrasonic waves are produced and work and their devastating effect on small living organisms. He foresees the time when they will be used for soil disinfection and ultra-short waves for disinfesting cured tobacco.

3023. Dominick, C. B.
Control of hornworms on tobacco.
J. econ. Ent., 1950, **43**: 221-2, bibl. 1.

Three organic insecticides were compared with cryolite for the control of tobacco hornworm, *Protoparce sexta*, and the tomato hornworm, *P. quinquemaculata*. Toxaphene and dichlorodiphenyl dichloroethane were highly effective against both species; dieldrin was not so effective as cryolite.

3024. Gualdi, G.
Sulla elettroforesi nel tabacco. **(The effect of electrolysis on tobacco.)**
Tabacco, 1950, **54**: 128-57, 229-34.

The opinions of the two Russian workers, Ilyin and Schmuck, based on their own experiments on the electric treatment of strong tobacco for the diminution of nicotine content, are discussed at considerable length. Gualdi comes to the conclusion that the methods envisaged are not commercially applicable. The chief points which he makes against the process are: that the diminution in nicotine is achieved at the expense of combustibility and hence flavour, and that the heating of the tobacco experienced during the process leads to deterioration in quality.

Drug plants.

(*See also* 3397.)

3025. Fulling, E. H. [Editor].
Some potential sources of important plant products in California.
Econ. Bot., 1950, **4**: 3-36, bibl. 12, illus.

A summarized account is given of 12 papers originally published in the "Proceedings of the Third Annual Conference on the Cultivation of Drug and Associated Economic Plants in California, 1947". Plants described include the California tanbark oak (*Lithocarpus densiflora*), wattle (*Acacia* spp.) and other sources of tannins, *Yucca brevifolia* as a possible source of vanillin, *Rhamnus purshiana* the bark of which supplies cascara, camphor, safrole (best produced from *Dorryphora sassafras*), castor beans, thymol (from *Eucalyptus dives* and *Umbellularia californica*), sweet basil and other essential oils. Mention is made of many other species of plants, and notes are given in some cases on methods of cultivation, harvesting and extracting and on yields and present production.

3026. Luthra, J. C.
Some important economic plants and their cultivation.
Indian Fmg, 1950, **11**: 10-14, plates 7.
Notes accompanied by illustrations are given on the following plants: *Apium graveolens*, *Artemisia* spp., *Atropa belladonna*, *Colchicum luteum*, *Citrullus colocynthis*, *Derris* spp., *Digitalis* spp., *Dipsacus fullonum*, *Glycyrrhiza glabra*, *Hyoscyamus* spp., *Holarrhena antidysenterica*, *Lallemantia royleana*, *Mentha piperita*, *Psoralea corylifolia*, *Polygala chinensis*, *Psychotria ipecacuanha*, *Plantago* spp., *Podophyllum emodi*, *Rheum emodi*, *Saussuma lappa* and *Swertia chiretta*.

3027. Anon.
Les plantes médicinales et aromatiques d'origine locale. **(The drug and aromatic plants of Algeria.)**
Rev. hort. Algér., 1950, **54**: 136-57.
The numerous plants concerned are grouped as trees, shrubs, herbaceous perennials, bulbs, climbers, aquatic plants or annuals, and information is tabulated for each under the following headings: Common name (French), botanical name, Arab and Berber names, part of plant used, season of gathering, utilization.

3028. Webb, L. J.
An Australian phytochemical survey—Part I.
Bull. C.S.I.R.O. Aust. **241**, 1949, pp. 56, bibl. 5.
Species of 41 families were found to contain appreciable quantities of alkaloids or alkaloidal substances and 11 species gave positive tests for hydrocyanic acid. The results of this extensive survey are tabulated according to name of plant, locality, month, and plant part tested, and extract and alkaloidal reagent used.

3029. Collins, W. F., Wild, H., and Hopkins, J. C. F.
Poisonous plants of the Marandellas district.
Rhod. agric. J., 1950, **47**: 106-25, bibl. 14, illus.
Descriptions are given with coloured drawings of 19 plants found in Rhodesia and of the *Diplodia* dry rot of maize which are poisonous to livestock or man. The active principle is stated in some cases. The plants include castor oil and *Mundulea sericea* (Willd.) A. Chev., a legume whose roots and bark contain a fish poison identical, or closely related, to the rotenone in derris.

3030. Bick, I. R. C., and Todd, A. R.
Alkaloids of *Daphnandra* species. Part II. Micranthine.
J. chem. Soc. Lond., 1950, pp. 1606-12.
Micranthine is an alkaloidal constituent of the bark of *Daphnandra micrantha* grown in Queensland, Australia.

3031. Barnard, C.
The *c*-mitotic activity of cryptopleurine.
Aust. J. Sci., 1949, **12**: 30-1, bibl. 2, illus.
As part of the C.S.I.R.* drug plant survey a number of plant extracts obtained from native plants are being examined for *c*-mitotic activity. With extracts tested on the root tips of germinating onion seeds 21 have so far given positive reactions, the five native species giving the most marked results being listed, as well as three exotic species reported to contain colchicine. The most remarkable results, however, have been obtained with the hydrochloride of the alkaloid cryptopleurine from *Cryptocarya pleurosperma*, which in aqueous solution proved effective over a range of from 0·5% to 0·00025% and for cytological purposes would seem to be an excellent substitute for colchicine.

3032. Gardella, C.
Overcoming barriers to crossability due to style length.
Amer. J. Bot., 1950, **37**: 219-24, bibl. 15, illus.
In crosses of *Datura inoxia* × *D. ferox* and *D. inoxia* × *D. quercifolia* where barriers to crossability due to the effect of a foreign and longer style upon the male gametes had previously been thought to prevent fertilization, style splicing and style insertions enabled pollen tubes of *D. ferox* and *D. quercifolia* to reach the ovules of *D. inoxia*. Evidence was presented that fertilization and some development of the embryo and endosperm had occurred in these crosses. A further barrier to crossability in the form of endothelial proliferation prevented the development of viable embryos. Such proliferations were also found in the intact style pollination of *D. inoxia* × *D. ferox* and *D. inoxia* × *D. quercifolia*, indicating that fertilization, in these cases, is not responsible for incompatibility. [Author's summary.]—Indiana University.

3033. S., E. H. G.
Santonica (wormseed).
Col. Plant Anim. Prod., 1950, **1**: 68-71, bibl. 15.
Santonica which yields santonin consists of the dried unexpanded flower-heads of *Artemisia cina* Berg. and other species of *Artemisia*. The literature on the distribution of these species and their utilization as sources of santonin is reviewed briefly.

Oil plants.

(*See also* 2311, 3385.)

3034. Schofield, M.
History of vegetable oils.
Food, 1950, **19**: 268-9.
The author reviews successes and failures in the raising of olive, ground-nut, soya and sunflower in various parts of the world.

* Now C.S.I.R.O.

3035. Anon.
Perfumery and essential oils.
Manuf. Chem., 1950, **21**: 69-71, bibl. 34; 207-10, bibl. 32; and 340-2, bibl. 26.
In these progress reports essential oils of the following plants are discussed: Coriander, citrus, *Myroxylon pereirae* and *M. balsamum*, *Eucalyptus citriodora*, *Geranium macrorhizum*, *Pittosporum eugenoides* and *P. tenuifolium*, *Sophora* spp., *Myrtus communis*, *Lavandula stoechas*, *Thymus vulgaris*, carob, *Myoporum laetum*, *Perilla citriodora*, *Escholtzia cristata*, *Pinus* spp., *Cistus labdaniferus*, caraway, *Melaleuca linariifolia* and *M. viridiflora*, *Litsea guatemalensis*, *Aegle marmelos*, *Hardwickia pinnata*, *Pulicaria mauritanica* and *Mentha arvensis*.

3036. Dios, R., and Vieitez, M. G.
Contribución al estudio de los aceites vegetales en dependencia con el clima y suelo. I. Aceite de *Camellia japonica*. **(Contribution to the study of oils in relation to climate and soil. I. Oil of *Camellia japonica*.)** [English summary 10 lines.]
An. Inst. Edaf., 1949, **8**: 791-810, bibl. 51.
The oil content of the kernel of *Camellia japonica* grown in Galicia proved to be 64·4% or much the same as elsewhere. Figures are compared.

3037. Xabregas, J.
Características dos óleos de rícino nacionais. **(The characteristics of the oil of the castor oil plant.)** [English summary ½ p.]
Agron. lusit., 1948, **10**: 231-9, bibl. 22.
The culture of the castor oil plant (*Ricinus communis*) in the Portuguese African colonies is being encouraged. The characteristics of the types of oil produced at present are being studied with a view to raising improved types of plants.

3038. Meinders, H. C., and Jones, M. D.
Pollen shedding and dispersal in the castor plant *Ricinus communis* L.
Agron. J., 1950, **42**: 206-9, bibl. 6, illus.
Data were obtained at Stillwater, Oklahoma, relating to the time of day of pollen shedding, the relative amounts of pollen dispersed in the air at various distances from their source, and the number of days that the staminate flowers shed pollen. Genetic identity can be well maintained in castor plant seed production under an isolation of 60 rods [=330 yards]. [From authors' summary.]

3039. Balašev, L. L., and Sannikova, H. M.
The effect of root nutrition on the sex characters in the castor oil plant. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1948, **60**: 1061-3, bibl. 11 [received 1950].
The authors review previous work on the effect of nutrition on the sex of flowers and mention results of their own observations on potted plants of castor oil [*Ricinus communis*]. It was found that potassium stimulated the development of ♀ flowers, phosphorus that of ♂ flowers.

3040. Cosgrove, D. J., Islip, H. T., and Major, F.
Oil of *Lippia carviodora* from Kenya.
Col. Plant Anim. Prod., 1950, **1**: 56-62.
Analyses are given of samples of oil from flower heads and leaves and twigs of a new species of *Lippia, L. carviodora*, and the opinion is expressed that the oil has definite promise, both on its own account for perfumery and flavouring, and as a source of carvone. Small-scale cultivation trials are in progress, and it is believed that in Kenya the plant needs an altitude of 3,000-4,000 ft. and a rainfall of 25-35 in., preferably falling at two different periods, in order to produce two flushes a year.

3041. Ellis, N. K., and Stevenson, E. C.
Domestic production of the essential oils of peppermint and spearmint.
Econ. Bot., 1950, **4**: 139-49, bibl. 9, illus.
The United States dominates the world's production of mint oils, over half of them being used for flavouring chewing gum. History, production statistics and taxonomy are given. Mint will grow well in deep, well-drained but not dry soils, the best yields being obtained on mineral soils with pH 6·0 to 7·5 and on organic soils with pH 5·2 to 6·7. It requires an even distribution of rainfall during the growing season, or irrigation. It is propagated vegetatively. Control of weeds is extremely important because their presence in the mint hay may result in lower quality oil, and pest and disease control is essential to ensure good yields. The oils occur in minute glands to be found mainly on the undersides of the leaves, and are extracted by steam distillation. Correct time of harvest is determined by trial distillation.

3042. Hotin, A. A.
The accumulation of essential oil in peppermint as affected by external conditions. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1950, **72**: 965-8, bibl. 3.
It is shown that external conditions, particularly temperature, soil moisture, and root nutrition, are important factors affecting the synthesis of essential oil in peppermint (*Mentha piperita*). Such factors bear a relation to the ecological requirements of the plant, for it normally grows in moist places. Cultivating peppermint at a daily temperature above 20°C during the growing period increases the essential oil by 25 to 35% over that produced at lower temperatures. Low soil and air moisture causes a sharp drop in productivity, with a corresponding fall in the percentage of oil in the leaves and inflorescences.

3043. Madel, W.
Beobachtungen über das Auftreten des "Leindotterrüsslers" *Ceuthorrhynchus syrites* Germ. **(Observations on the occurrence of "camelina weevil".)**
NachrBl. dtsch. PflSchDienst. Braunschweig, 1950, **2**: 90-2, bibl. 28.
Ceutorrhynchus syrites Germ., a pest of the oil seed plant gold of pleasure (*Camelina sativa* Crantz.) in Eastern Europe, has been found also in the West, including southern England. It attacks the young plants without causing serious damage. Observations on incidence and damage in southern Germany during the last 3 years are noted. A 0·1% Nexen (hexaemulsion) spray, shortly before flowering, gave satisfactory control.

3044. Sag, G.
Culture du carthame dans la région Girondine. (Note préliminaire.) (Preliminary note on the cultivation of safflower in the Gironde.)
Rev. int. Bot. appl., 1950, **30**: 216-22, bibl. 16.

Following a review of the literature on *Carthamus tinctorius* L. with special reference to oil contents obtained in different parts of the world and to the chemical constituents of the oil, an experiment with three varieties in the Gironde is described. Two varieties previously acclimatized in the area gave yields of 17·5 and 20 kg./ha. on an acid clayey sand deficient in potash, whereas a newly introduced Moroccan variety, containing both spiny and spineless forms, was an almost complete failure. A slight drop in oil content noted is attributed to lack of potash.

3045. Sherman, C. B.
Better safflower is here.
Bett. Crops, 1950, **34**: 3: 21, 41-2, illus.

Safflower, an erect and spiny oil-seed plant, 18-40 inches high, does well on sandy or clay loam soil and needs about as much moisture as flax. Certified N-852, a new variety developed at the University of Nebraska, has an average oil content of 32%, and varieties of higher yield are nearly ready for release. Yield of seed varies greatly, from 350 to 2,750 lb. per acre, according to conditions.

Rubber plants.

3046. Dikusar, I. G., and Kalinkevič, A. F.
The response of kok saghyz to mineral fertilizers. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1948, **60**: 631-3, bibl. 16 [received 1950].

The productivity of kok saghyz varieties varies with nutritional factors. Under some circumstances the greatest productiveness was shown by the variety Navašina (a tetraploid form), under others by the variety Bulgakova 485 (a diploid form). The latter is the more productive with relatively high potash, the former with phosphate. The amounts, periods and methods of applying the fertilizers to the two varieties should be different. The agrochemical characteristics of a variety must take precedence over varietal research in the different geographical centres.

3047. Johnson, B. L.
High rubber yielding selections from a natural population of guayule.
Agron. J., 1950, **42**: 345-50, bibl. 15.

Guayule accession 4265 representing a mass seed collection from 5 plants occurring in a native stand in Durango, Mexico, was compared with variety 593 (the best of the commercial varieties), for date of first bloom in 1945, height and spread at 17 and 36 months, and rubber and resin content at 2 and 3 years. In all except the first, 4265 proved significantly superior. Interplot variance was greater in 593 as regards date of bloom, height and spread, but in 4265 for rubber and resin content at 2 years. Accession 4265 was found to be separable into 3 morphological types differing significantly in all characteristics under examination, and showing similar inter-plot variance within the type, which is taken to indicate progenies of 3 plants in the original collection. Two of the types were markedly superior to 593; and evidence is given to suggest that each type is largely apomictic. Factors affecting the possibility of selection for high yielding, facultative apomictic strains are briefly discussed.—Guayule Research Project, U.S.D.A., Salinas, California.

3048. Tysdal, H. M.
Apomictic interspecific hybrids are promising for rubber production from guayule.
Agron. J., 1950, **42**: 351-5, bibl. 12, illus.

The author discusses the value of hybrids between rubber-producing guayule (*Parthenium argentatum*) and closely related species, particularly *P. stramonium*. Crosses can be obtained at the 36 chromosome level with *P. stramonium*, which are suitable for back crossing. He describes how crosses yielding up to 40% more rubber than the parent guayule plant can be obtained.—U.S. Natural Rubber Research Station, Salinas, California.

3049. Benedict, H. M.
The effect of soil temperature on guayule plants.
Plant Physiol., 1950, **25**: 377-88, bibl. 18.

Two experiments in 1947 and 1948 are reported in which guayule plants were grown in a constant air temperature of about 76° F. but in soil temperatures varying from 40° to 95° F. The fine, sandy, non-calcareous loam used in the first experiment produced very rapid initial, but much reduced later, growth. The coarse, sandy loam used in the second experiment gave a steady and fairly rapid growth throughout. In both experiments the maximum dry weight of the above ground parts of the plants and the highest yield, though not the highest percentage, of rubber occurred at a soil temperature of 80° to 85° F. The maximum dry weight of roots occurred at 65° F., and the lowest dry weight of all parts of the plants at 40° to 45° F. Differences were proportionately much less marked in the first than in the second experiment, indicating the influence of some additional factor such as soil. The percentages of free sugars, levulins, inulin, rubber and resin decreased as the soil temperature was increased to 65° F. Above 65° F. they mostly remained steady, though the rubber and resin percentages rose in the first experiment and continued to decline in the second as the temperature was increased to 95° F.

3050. Gerstel, D. U.
Is resistance to verticillium wilt in guayule related to chromosome number?
Agron. J., 1950, **42**: 310-11, bibl. 3, illus.

A short note is given of the evidence adduced in work which has now been discontinued.

3051. Cassidy, T. P., and others.
Damage to guayule by insects and mites with notes on control.
Circ. U.S. Dep. Agric. **842**, 1950, pp. 19, bibl. 8, 10 cents.

A comprehensive list of guayule pests and appropriate control measures is given based on experience in 1943 to 1945 in nurseries, field plantings and greenhouses in California, Arizona, New Mexico and Texas.

Seaweeds.

3052. BLACK, W. A. P.
The effect of the depth of immersion on the chemical constitution of some of the sub-littoral seaweeds common to Scotland.
J. Soc. chem. Ind. Lond., 1950, **69**: 161-5, bibl. 16.
In general, in the fronds an increase in mannitol occurs with depth, reaching a maximum at 6-10 m. Laminarin decreases progressively with depth, being at a maximum at 3-6 m., and is absent in samples from a depth below 16 m. [From author's summary.]—Inst. of Seaweed Res., Inveresk Gate, Musselburgh, Midlothian.

Noted.

3053.

a ANDREAE, W. A., AND THOMPSON, K. L.
Effect of leaf roll virus on the amino-acid composition of potato tubers.
Nature, 1950, **66**: 72-3, bibl. 7.

b BEWLEY, W. F.
Crops under glass in the Lea Valley.
World Crops, 1950, **2**: 238-40, illus.

c BURTON, W. G., AND SPRAGG, W. T.
A note on the intercellular space of the potato tuber.
New Phytol., 1950, **49**: 8-10.

d CAMPBELL, J. C. [Editor].
American Potato Yearbook, 1950.
289 Fourth Avenue, New York 10, N.Y., 1950, pp. 76.

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Potato flea beetle.
Processed Publ. Ser., Ent., Dep. Agric. Ottawa, **94**, 1949, pp. 4.

f COMMONER, B., AND OTHERS.
Microanalytical determination of the rate of tobacco mosaic virus synthesis in tobacco leaf tissue.
Arch. Biochem., 1950, **27**: 271-86, bibl. 16.

g DANISH SEED TESTING STATION (STAHL, C.).
Beretning fra Statsfrøkontrollen for det 78. arbejdsår fra 1. juli 1948 til 30. juni 1949. **(Seventy-eighth Report of the Danish Seed Testing Station for the year 1 July 1948-30 June 1949.)** [English summary pp. 2¼.]
Tidsskr. Planteavl, 1950, **3**: 461-537.

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The cytology of the hop: a critical review of published work.
A.R. Wye Coll. Dep. Hop Res. for 1949, 1950, pp. 48-54, bibl. 19.

i DAVISON, D. C.
Factors concerned with the oxidation of reduced coenzymes, and the reduction of cytochrome *c* in pea seedlings.
Nature, 1950, **166**: 265-6, bibl. 6.

j DEPARTMENT OF AGRICULTURE FOR SCOTLAND.
Key to potato trials and collections at East Craigs, 1950.
[*Publ.*] *Dep. Agric. Scotland*, H.M. Stationery Office, Edinburgh, 1950, pp. 49, 1s. 3d.

k FITZPATRICK, R. A.
Marketing Massachusetts potatoes. Part I. Potato storage facilities.
Bull. Mass. agric. Exp. Stat. **454**, 1950, pp. 32.

l GERSTEL, D. U., AND RINER, M. E.
Self-incompatibility studies in guayule. I. Pollen-tube behavior.
J. Hered., 1950, **41**: 49-55, bibl. 28, illus.

m GODDARD, D. R., AND HOLDEN, C.
Cytochrome oxidase in the potato tuber.
Arch. Biochem., 1950, **27**: 41-7, bibl. 9.

n GRASSO, V.
Nuove e gravi malattie di piante ortive in Italia. **(Serious new diseases [of celery, artichoke, cauliflower and lettuces] caused by *Sclerotinia sclerotiorum* in Italy.**
Riv. Ortoflorofrutt. ital., 1950, **34**: 16-19, bibl. 10.

o HABER, E. S.
Potato growing in Iowa.
Bull. Ia agric. Exp. Stat. **P104**, 1950, pp. 555-66.
Practical hints.

p HAGEDORN, D. J., AND WALKER, J. C.
The relation of bean virus 2 to pea mosaic in Wisconsin.
Phytopathology, 1950, **40**: 684-98, bibl. 16, illus.

q HASSEBRAUK, K.
Krankheiten und Schädlinge des Spargels. **(Asparagus diseases and pests.)**
Flugbl. biol. Bundesanst. Braunschweig **H 6**, 1950, pp. 12.

r HEY, A.
Über die Verbreitung des Kartoffelkrebserregers (*Synchytrium endobioticum* [Schilb.] Perc.) in den Ländern der Deutschen Demokratischen Republik. **(Distribution of potato wart disease in the States of the German Democratic Republic.)**
NachrBl. dtsch. PflSchDienst Berlin, 1950, **4**: 93-6.

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The relationship between colour and necrosis to potato virus X in *Amaranthus gangeticus* L.
J. Aust. Inst. agric. Sci., 1949, **15**: 131-4, bibl. 3, illus.

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Diseases of hops.
A.R. East Malling Res. Stat. for 1949, 1950, **A33**, pp. 174-9, illus.
Reprint of paper already abstracted (*H.A.*, 20: 328).

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A modification of the Warburg respirometer to measure the respiration rate of tomato leaf discs.
Plant Physiol., 1950, **25**: 354-5, bibl. 3.

v KOGEKAR, V. K.
***Basella rubra:* a climbing leafy vegetable.**
Indian Fmg, 1950, **11**: 50.

w LANA, E. P.
Reciprocal crosses in the squash, *Cucurbita maxima* Duch.
Tech. Bull. Minn. agric. Exp. Stat. **189**, 1950, pp. 28, bibl. 14.

x MINISTRY OF AGRICULTURE, LONDON.
Potato virus diseases.
Adv. Leafl. N.A.A.S. Lond. **139**, 1950, pp. 8, illus., 1d.
The symptoms and control of leaf roll and rugose mosaic.

y MINISTRY OF AGRICULTURE, LONDON.
Onions.
Adv. Leafl. N.A.A.S. Lond. **358**, 1950, pp. 4, 1d.

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Twin and triplet pepper seedlings: a study of polyembryony in *Capsicum frutescens*.
J. Hered., 1950, **41**: 91-5, bibl. 17, illus.
[See also *H.A.*, 20: 1650.]

3054.

a MÜLLER, F. P.
Über das Zahlenverhältnis der Geschlechter beim Kartoffelkäfer (*Leptinotarsa decemlineata* Say) im Freiland. **(The sex ratio in Colorado beetles found in the field.)**
NachrBl. dtsch. PflSchDienst Berlin, 1950, **4**: 141-6, bibl. 23.

b NOSTI, J.
La patata de siembra en España. **(Seed potato growing in Spain.)**
[*Publ.*] *Minist. Agric., Madrid*, 1949, pp. 215, from review in *Pomme de Terre franç.*, 1950, **13**: 132: 21-2.

c OWENS, H. B., AND DITMAN, L. P.
Liquefied gas aerosols for home gardens.
J. econ. Ent., 1950, **43**: 194-8, illus.

d POWERS, L., LOCKE, L. F., AND GARRETT, J. C.
Partitioning method of genetic analysis applied to quantitative characters of tomato crosses.
Tech. Bull. U.S. Dep. Agric. **998**, 1950, pp. 96, 15 cts.
A highly technical paper for the statistical geneticist.

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Paradicsom hybridek minöségi vizsgálata. **(Study of the chemical composition of the fruits of tomato hybrids.)** [English summary ¼ p.]
Bull. Fac. Hort. Buda., 1949, **13**: 182-6, bibl. 10.

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Fusarium strains causing pea and bean root rot.
Phytopathology, 1950, **40**: 664-83, bibl. 17, illus., being *J. Pap. N.Y. St. agric. Exp. Stat.* **802.**

g SINGH, D.
Inheritance of certain economic characters in the squash, *Cucurbita maxima* Duch.
Tech. Bull. Minn. agric. Exp. Stat. **186**, 1949, pp. 30, bibl. 20.

h STOVER, R. H.
The black rootrot disease of tobacco. I. Studies on the causal organism *Thielaviopsis basicola*.
Canad. J. Res., Sect. C, 1950, **28**: 445-70, bibl. 28, being *Contr. Div. Bot. Plant Path., Sci. Serv., Dep. Agric. Canada* **1033.**

i TAUBÖCK, K.
Untersuchungen zur Frage der niederösterreichischen Kartoffel-Gesundgebiete und zur Züchtung aphidenresistenter Kartoffelsorten. **(Seed potato growing areas of Lower Austria, and the breeding of aphid resistant potato varieties.)**
Bodenkultur, 1950, **4**: 145-51, bibl. 11.

j WAGENINGEN.
Pulses. (Peas, common beans, haricot beans.)
Govt Cttee Compil. List Vars Field Crops, Wageningen, Netherlands, 1949, pp. 29.
Twenty-fourth descriptive list of varieties of field crops.

k WAGENINGEN.
Potato varieties.
Govt Cttee Compil. List Vars Field Crops, Wageningen, Netherlands, 1950, pp. 47.
Twenty-fifth descriptive list of varieties of field crops.

l WILSON, J. D.
Controlling diseases of vegetable crops with organic fungicides.
Agric. Chemls, 1950, **5**: 7: 32-3.

m ZACHER, F.
Ausbreitung des Speisebohnenkäfers (*Acanthoscelides obtectus* Say.) in Deutschland. **(The spread of the American seed beetle in Germany.)**
NachrBl. dtsch. PflSchDienst. Braunschweig, 1950, **2**: 121, bibl. 12.

FLORICULTURE.

General.

(*See also* 2576, 3393, 3411, 3440.)

3055. DAEPP, H. W.
Ein neues und praktisches Gerät zum Beschreiben von Holtzetiketten. (A new instrument for the lettering of garden labels.)
Gärtnermeister, 1950, **53**: 287, illus.
The application of poker-work to garden labels and tools by means of an electric pencil is described and illustrated. Messrs. Edur AG, Zürich, are the manufacturers.

3056. ZIMMERMANN, A.
La région du Lautaret et son jardin alpin. (The Lautaret region [French Alps] and its alpine botanical garden.)
Rev. hort. suisse, 1950, **23**: 223-7, illus.
A brief description of the alpine garden near Grenoble and its setting, at an altitude of 2,058 m., with an outline of its history.

3057. NICKLOVÁ-NAVRÁTILOVÁ, H.
Tři čtvrti roku zahradnické praxe očima fytopatologa. (Nine months' observations on horticultural practice by a phytopathologist.)
Ochr. Rost., 1949, **22**: 238-56, bibl. 13.
An account of the most commonly occurring pests and diseases in commercial ornamental gardens in Czechoslovakia.

3058. GUEIT, —.
Les conditions de réussite du bouturage. (Conditions affecting the success of propagation by cuttings.)
Rev. hort. Algér., 1950, **54**: 91-7.
Following a general account of the factors influencing the success or otherwise of propagating plants from cuttings, lists are supplied, mainly of ornamentals but containing some fruit plants, under such headings as organ from which to take cuttings, ease of rooting, presence or absence of root and bud initials, age and length of cuttings, presence or absence of leaves, method of setting, rooting media, temperatures, humidity and light.

3059. STEIL, W. N.
Some evidences for the interaction of tapetal and sporogenous cells in certain vascular plants.
Bot. Gaz., 1950, **111**: 300-6, bibl. 30, illus.
If there is an interaction between tapetal and sporogenous cells, as is suggested, it is possible to account partially for the sterility reported in some pteridophytes, especially some of the ferns, and in a number of seed plants. [From author's summary.]—Marquette University, Wisconsin.

3060. B., N. C.
High altitude tests disclose no harm to flower shipments.
Flor. Exch., 1950, **114**: 18: 14.
Trials in California with fresh flowers showed that altitudes up to 20,000 feet had no effect on flowers. Adverse temperatures and humidity would, of course, affect them. Insulating blankets increased the protection against extreme and rapidly changing temperatures.

3061. ANON.
Important florist uses found for glycerine in stimulating plant growth, preserving life.
Flor. Exch., 1950, **115**: 6: 13, bibl. 16.
A review of literature cited on the protective, antifreezing, foliage improving and cut-flower preserving action of glycerine. Formulae are given of solutions with glycerine base for dry preservation of twigs and buds in their natural state, and for improving the appearance and prolonging the life of cut flowers.

3062. BAKKER, J.
Prolongation de la vie des fleurs coupées. (Prolonging the life of cut flowers.)
Vakbl. Bloem., 25 Nov., 1949, from abstr. in *Courr. hort.*, 1950, **12**: 219-20, illus.
Mention is made of trials, giving satisfactory results, of "Chrysal", a proprietary preparation for prolonging the life of cut flowers. It is a Belgian product sold in 30 g. packets, and in metal boxes containing 750 and 1,500 g. and is generally used at 15 g. per litre. [Its composition is not stated.]

3063. CALVINO, E. M.
I nematodi delle piante da fiore in Italia, I e II. (Eelworm pests of Italian floriculture and their control.) [Short English summaries.]
Ann. Sper. agrar., 1950, **4** (N.S.): 119-52, bibls. 24+24.
In the first part the plants and their hosts are discussed, in the second recommendations are made for control. The following receive most attention from eelworms and the present author: carnations, gladioli, anemones, cyclamen, ranunculi, antirrhinums, hyacinths, narcissi, violets, chrysanthemums, *Phlox paniculata* and hydrangeas. Others are dealt with more briefly.
In Part II, methods of control are considered at some length. They include soil treatment by various chemicals, which the author considers uneconomic, treatment of the plants or bulbs with various substances and cultural treatment. He considers that future success may lie in biological control of a fungal nature such as has been attempted in Hawaii. In the sandy soils of California the preparatory sowing of *Crotalaria spectabilis* has enabled the parasitic fungi to attack the eelworm. Although such a treatment is unlikely to be economic in Italy at present, biological control is in the author's opinion the most promising method. He also discusses the distressing faculty possessed by nematodes of remaining dormant for very long periods which makes their control more difficult.

Garden flowers.

3064. CHAPLIN, P. H.
Carnations for the cut flower market.
Agriculture, Lond., 1950, **57**: 234-6.
A brief account is given of some of the methods used in Meadhurst Park Nursery for the cultivation of carnations under glass, with particular reference to mechanization, pest control and packing.

3065. Guba, E. F.
Carnation diseases and their control.
Flor. Exch., 1950, **115**: 3: 10-11, and 5: 10.
A key to the identification of carnation wilt diseases, control measures and tabulated results of treatments are given.—University of Massachusetts.

3066. Theau, A.
La fumure du chrysanthème en Algerie. **(The manuring of chrysanthemums in Algeria.)**
Rev. hort. Algér., 1950, **54**: 172-4.
Suggestions are made on quantities of farmyard manure and NPK mixtures to apply to garden and potting soils used for chrysanthemums.

3067. Baker, K. F.
California's disease problem.
Flor. Exch., 1950, **114**: 19: 14, 20-1, 33.
Some of the more common diseases of chrysanthemums, foliage plants and asters are briefly discussed.

3068. Anon.
No easy way out of chrysanthemum stunt.
Bull. N.Y. St. Flower Gr., 1950, No. 57, pp. 4-6, bibl. 4.
During large-scale tests to control chrysanthemum stunt, no new satisfactory method was found [see *H.A.*, 19: 3302].

3069. Dlabola, J., and Starý, B.
Nový škůdce na chrysantémách. **(New pest on chrysanthemums in Czechoslovakia.)** [Russian summary ½ p.]
Ochr. Rost., 1949, **22**: 230-3, bibl. 3, illus.
The authors describe the first case of attack on chrysanthemums by *Cicadella atropunctata* in a nursery near Prague. The only variety attacked was the yellow Lapiche. The damage is inflicted on the petals and the lower leaf surfaces. DDT (Gesarol) gave good control.

3070. Behr, L.
Über ein Auftreten der Chrysanthemum-Gallmücke in Berlin. **(The chrysanthemum gall midge in Berlin.)**
NachrBl. dtsch. PflSchDienst Berlin, 1949, **3**: 53-4, bibl. 5.
Although the chrysanthemum gall midge, *Diarthronomyia* (*Cecidomyia*) *chrysanthemi*, was considered very rare in Germany, it is now found to have caused serious damage at two Berlin nurseries during the past 10 years.

3071. Laskaris, T.
The *Diplodina* disease of delphinium.
Phytopathology, 1950, **40**: 615-26, bibl. 6, illus.
A new disease of delphinium caused by *Diplodina delphinii* sp. nov. is described from New York, New Jersey and Connecticut. In view of its prevalence in the plantings examined its probable importance as a source of crown rot losses is indicated; in addition to crown rot it causes a black leaf spot, petiole rot and stem canker. No experimental work has been carried out on its control, but it is suggested that dead and decaying parts of the plants should be removed and that plants might be sprayed in the spring, and possibly also later in the season, with a fungicide such as bordeaux. Over-watering or excessive feeding should be avoided.

3072. Ashby, E., and Wangermann, E.
Studies in the morphogenesis of leaves. IV. Further observations on area, cell size and cell number of leaves of *Ipomoea* in relation to their position on the shoot.
New Phytol., 1950, **49**: 23-35.
An account of experiments with *Ipomoea purpurea*. It is concluded that the gradients of cell size and cell number in leaves from successive nodes (although affected by the environment) are a response to the position of the leaves on the shoot *per se*, and are symptomatic of some process of aging in the apical meristem.—Department of Botany, Manchester University.

3073. Post, K., and Horton, F. F.
Give kalanchoes only twenty short days.
Bull. N.Y. St. Flower Gr., 1950, No. 57, p. 7.
From results of experiments conducted at Cornell University, it appears that kalanchoes produce most compact and probably most desirable plants, when they are given short-day treatment for not more than 20 to 25 days in summer, followed by long days.

3074. Baker, K. F., and Davis, L. H.
Heterosporium disease of nasturtium and its control.
Phytopathology, 1950, **40**: 553-66, bibl. 15, illus.
In recent years *Heterosporium tropaeoli* has caused a serious reduction in yield of nasturtium seed (*Tropaeolum majus* L.). The disease is described and suggestions are made for its control by hot-water seed treatment.

3075. Samygin, G. A.
The correlation of the number of hours of strong and weak light with the development of rudbeckia. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1948, **60**: 1077-80, bibl. 11, illus. [received 1950].
It was found that the processes inducing the transition from the purely vegetative stage to the initiation of the flowering stem (the beginning of the reproduction phase of development) could take place in the leaves of the long-day plant *Rudbeckia bicolor* in long-day illumination not only in strong sunlight but also in weak light of an intensity of 70 foot-candles. This was observed, however, only if the plants had a sufficient store of nutrient substances.

Bulbs, tubers, etc.

(*See also* 2255, 3409.)

3076. Abbiss, H. W.
1. Leave some leaves to feed bulbs.
2. Cool treatment gives the earliest bulbs.
3. Bulb varieties for cooling.
Grower, 1950, **33**: 1,111, 1,165 and 1,204.
The first article consists of notes on soils, manures, rotations and planting distances for narcissi, tulips and iris and on the hot water treatment of narcissus bulbs against eelworm and daffodil fly. The second deals

with windbreaks, roguing, disease and pest control, and, in more detail, with cooling at 48° F. for 7 to 9 weeks from August onwards to promote earlier growth and flowering in the winter. The third lists varieties of narcissus, tulip and iris that have been found suitable for cooling.

3077. MILLER, V. L., COURTNEY, W. D., AND ANDERSON, B. L.
Stability of formaldehyde solutions used in bulb treatments.
Phytopathology, 1950, **40**: 627-31, bibl. 6, being *Sci. Pap. Wash. St. agric. Exp. Stat.* **878.**

The results of experiments with electrically heated tanks all show little or no loss of formaldehyde on heating. A small tank over eight 4-hour heating periods without bulbs lost 11·5% formaldehyde and 22% water, and the concentration of the remaining solution thus increased by 10%. The same tank maintained its concentration when loaded with fresh narcissus bulbs through eight 4-hour runs when the replacement solution contained the same amount of formaldehyde as the solution in the tank. Similar results were obtained with a larger electrically heated tank with both narcissus and Croft lily bulbs. In commercial steam-heated tanks, however, the concentration of formaldehyde declined to 81 to 67% of the original concentration in from four to seven 4-hour heating periods, owing, it is thought, to dilution with condensed steam.

3078. ANON.
Virusziekten van dahlia's. **(Virus diseases of dahlia.)**
Vlugschr. PlZiekt. Dienst Wageningen, **66**, 1950, pp. 5, illus.

Symptoms, dispersion, and control (selection of healthy plants for propagation).

3079. LAIBE, B.
La culture du bulbe de glaïeul en Vaucluse. **(Gladiolis culture in Vaucluse, France.)**
Rev. hort. Algér., 1949, **53**: 368-74, reprinted from *Bull. Engrais*, Nov. 1949.

The cultivation of gladioli for bulbs in this area only started in 1946 but has made rapid strides. Methods of cultivation, rotations, multiplication, varieties, and marketing are described.

3080. GUEIT, —.
Glaïeuls à grandes fleurs. **(Large flowered gladioli.)**
Rev. hort. Algér., 1950, **54**: 20-32.

The growing of gladiolus for cut flowers in the coastal region of Algeria should be developed, and the author describes the characters that constitute quality in the flower, new and established varieties and the needs of the plant as regards soil, climate, cultivation and control of diseases and pests.

3081. STUART, N. W., AND MCCLELLAN, W. E.
Effect of nutrients on glad growth.
Flor. Exch., 1950, **114**: 23: 11, 47, illus.

In a fertilizer trial in Florida the highest flower production was obtained when 800 lb. per acre of 5-10-5 was applied in the row before planting and 400 lb. per acre of 5-10-5 in each of 2 side dressings. This treatment also produced the highest but one yield of corms. Nutrient contents of gladioli plants are presented, without any conclusions being drawn from this preliminary study.

3082. MAGIE, R. O.
Fusarium—No. 1 killer of glads.
Flor. Exch., 1950, **114**: 20: 14-15, 38.

Fusarium disease, *Fusarium oxysporum* f. *gladioli* Sny. and Han., can be controlled economically by: (1) Maintaining a special propagating stock on clean soil and roguing all suspicious plants, (2) growing all planting stock from disease-free propagating stock on clean soil, (3) treating all corms with a recommended fungicide [recommendations given in article], harvesting corms as soon as cormels begin to colour up, and curing rapidly in shallow layers, (4) growing flowering stock on the same land only 1 year in 3 or 4. [From author's summary.]

3083. CARRERA, C. J. M.
La cura o tratamiento prealmacenaje de los bulbos de gladiolos. **(Prestorage treatment of gladiolus bulbs.)***
From abstr. in *Idia*, 1949, **2**: 24: 11.

The following treatments were tested as prestorage dips for control of *Fusarium oxysporum v. gladioli*: mercury dichloride, formaldehyde and ethyl mercury phosphate at 5%, hydroxymercury phenol at 30%, lysol and phenylmercury pyrocatechin at 2·9%, and hot water at 43-46° C. The best results were given by hydroxymercury phenol and ethyl mercury phosphate; when apparently healthy bulbs were treated, 94·9% and 86·6% respectively were still healthy on removal from store. Hot water treatment was ineffective.

3084. BARNARD, T. T.
Peacock moraeas.
J. roy. hort. Soc., 1950, **75**: 323-6, illus.

The author describes his collection of Peacock moraeas, made in South Africa and later transferred to a greenhouse in England. The collection, which began as a botanical one, now consists mainly of garden hybrids and seedlings. The Peacock moraeas, derived from five or six very variable native species, exhibit an endless combination of colours, and hybridization has added still further to their range of form and colour. The plants grew well in this country in a cold greenhouse on raised beds of gritty soil over rubble drainage. The corms should be lifted and replanted at least every three years during August. From then on they must be kept growing steadily until flowering time (March-April), after which they can be dried off rapidly and allowed to bake with full ventilation throughout the summer. Peacock moraeas appear to tolerate a wide range of growing conditions, but cannot be grown satisfactorily out of doors or in pots among other plants in a heated glasshouse.

3085. GOULD, C. J.
Diseases of bulbous iris.
Ext. Bull. Inst. agric. Sci. Wash. St. Coll. **424**, 1950, pp. 32, illus.

The diseases described are those showing leaf symptoms

* Paper given at the First South American Congress of Agricultural Investigations, La Estanzuela, Uruguay.

(winter injury, mosaic, black tip, leaf spot or fire, ink spot, bacterial blight), flower symptoms (mosaic, blindness, blasting), and bulb symptoms (crown rot, basal rot, nematode, blue mould, ink spot). Recommendations for their control are given. Some minor or uncommon diseases are briefly mentioned, and a method of preparing bordeaux-penetrol mixture is given.

3086. TINCKER, M. A. H.
Soil conditions, the growth of lilies and their roots.
Reprinted from *Lily Yearb. N. Amer. Lily Soc.*, 1950, **3**: 34-46, bibl. 10, illus.
The improvement of soil conditions for lilies.
Ibidem, pp. 46-55, bibl. 2, illus.

The experiments summarized in the first paper were carried out at Wisley during the period 1932-40, and have already been reported in the Lily Yearbooks of the Royal Horticultural Society. The results indicated the importance of good drainage for the growth and root production of lilies. Those reported in the second paper have not previously been fully described, although the results were summarized in the Lily Yearbook for 1947, pp. 82-6. Using *L. superbum*, *L. hansonii*, *L. speciosum*, *L. testaceum* and *L. candidum*, it was found that the addition of leaf mould and charcoal to clay or light sandy soil greatly improved the root and shoot development of the plants and increased the number of flowers. The effect was generally most striking in the clay soil series. When wet clay soils were used, only 20% of the *L. superbum* bulbs grew without the addition of leaf and charcoal, whereas with these additions 88% grew well. When the substances were added separately, there was still an improvement in each case; with *L. superbum* leaf mould had the greater effect in the first year and charcoal in the second, while with *L. hansonii* leaf mould gave better results in both seasons. The possible causes of these beneficial results are discussed. The addition of nitrogen, increased aeration, and the absorption of toxic substances are suggested as possible contributing factors.

3087. ROYAL HORTICULTURAL SOCIETY.
Wisley Trials 1948-1950. Narcissus at Wisley 1948-1950.
J. roy. hort. Soc., 1950, **75**: 331-4.

Of 125 narcissus varieties planted at Wisley in 1947 and 1948, 22 have been selected for trial as suitable for garden decoration by the Narcissus and Tulip Committee; the remainder were grown for comparison and judgement. This report indicates the Committee's recommendations, the present state of the trials, varieties retained and varieties deleted from the trials.

3088. LIMBER, D. P.
Ophiostoma on narcissus bulbs.
Phytopathology, 1950, **40**: 493-6.

Ophiostoma narcissi n.sp., found on narcissus imported into New Jersey, is described. It appears to be a saprophyte or a weak parasite which, under very favourable conditions, may cause decay.

3089. ANON.
Even temperature is the basis of good tulip forcing.
Grower, 1950, **34**: 359-63.

Notes, based on lessons learned in the past two or three years, are supplied on forcing houses, varieties, bulb sizes, preparation, boxing, on forcing and marketing and on pests and diseases.

Cacti.

3090. "CEPHALIUM."
Greffage des cactées. **(The grafting of cacti.)**
Rev. hort. suisse, 1950, **23**: 217-20, illus.

The advantages of grafting certain cacti—to substitute a weak root system, to hasten growth and to enhance flowering—are discussed and the methods used are described. Photographs illustrate some aspects of the technique and the importance of grafting for the raising of seedlings.

Roses and other shrubs.

(*See also* 2244, 2432, 2488-2490, 3383, 3405, 3422, 3431.)

3091. WELLS, J. S.
Pointers on propagation. Aerial layering.
Amer. Nurserym., 1950, **91**: 9: 8, illus.

Moderately good results were obtained with aerial layering of rhododendrons and hardy Ghent azaleas by the following method. A thin slice of 2-year-old stem was removed, and the resulting wound treated with hormone powder [material and concentration unstated] and wrapped in damp sphagnum moss; this was then covered with Du Pont polyphene. The marcots were made late in July, but it is believed that better results would have been obtained in May.

3092. MUNRO, J. A., AND POST, R. L.
Control of boxelder bugs.
J. econ. Ent., 1949, **42**: 994, bibl. 1.

Boxelder bugs, *Leptocoris trivittatus*, were sprayed in North Dakota, during the third week in September, when congregating on the trunks of boxelder trees, on weeds, and on the sunny sides of nearby buildings. Of the sprays applied, chlordan, lindane and toxaphene, all at 2% concentration, gave good control.

3093. BIOLOGICAL BRANCH, DEPARTMENT OF AGRICULTURE, VICTORIA.
A virus disease of daphne.
J. Dep. Agric. Vict., 1950, **48**: 139, illus.

Most daphne plants in Victorian home gardens are infected with a virus disease which reduces their vigour and length of life. Its spread is believed to be due to propagation from infected plants. The effect of the disease can be reduced by applying, every 4 to 6 weeks at 1 oz. per square yard, a manurial mixture consisting of superphosphate 1 lb., sulphate of ammonia 1 lb., sulphate of potash ¼ lb., and sulphate of iron ½ oz.

3094. COMETTI, L.
Alberetti ornamentali: l'*Hakea laurina*.
(Ornamental shrubs: *Hakea laurina*.)
Ital. agric., 1950, **87**: 316-18, bibl. 2, illus.

A short note on the introduction of *Hakea laurina* into Europe is followed by a description of the plant and its cultivation. It is said not to be attacked by pests except scale insects which are easily controlled by polysulphides or oil sprays.

3095. WELLS, J. S.
Use of sawdust for ericaceous crops.
Amer. Nurserym., 1950, **91**: 10: 7-8, 33, illus.

Sawdust was used with great success to replace one-third of the quantity of peat moss usually incorporated into the soil in which stocks of *Rhododendron ponticum* were raised. It was found necessary to apply several dressings of nitrogen while the sawdust was decomposing. As a mulch for rhododendrons and azaleas it also gave very good results.

3096. MOEWUS, F.
Zur Physiologie und Biochemie der Selbststerilität bei Forsythia. **(On the physiology and biochemistry of self-sterility in forsythia.)**
Biol. Zbl., 1950, **69**: 181-97, bibl. 25.

The two specimens of *Forsythia intermedia* examined were found to be dimorphous (heterostyly, heteroanthery), self-sterile and cross-fertile. Sterility results from the failure of the pollen to germinate in the presence of germination inhibitors, which have been identified as rutin (in the case of pollen from short-styled flowers) and as quercitrin (in pollen from long-styled flowers). The stigma of long-styled flowers excretes an enzyme that inactivates rutin, and quercitrin is inactivated by an enzyme present in the stigmata of short-styled flowers. The chemical mechanism operative in forsythia to ensure self-sterility and cross-fertility is thus explained.—Kaiser-Wilhelm-Inst. mediz. Forschung, Heidelberg.

3097. W., P. L. D.
Silver-leaf disease on rhododendron.
Gdnrs' Chron., 1950, **128**: 58, illus.

The silver-leaf disease, caused by the fungus *Stereum purpureum*, is occasionally known to attack rhododendrons. Symptoms of the disease on this host are limp leaves, the branches later beginning to die back. Infected branches should be removed and burned, and the wound coated with a mixture of 1 lb. white lead paint, 1 tablespoonful of linseed oil, 1 teaspoonful of paste drier and 1 tablespoonful of turpentine. Encouragement to healthy new growth should be given with sufficient moisture; when the attack is in its early stages no removal of wood may be necessary.

3098. BLIN, H.
La fertilisation des roseraies. **(Fertilizing rose beds.)**
Potasse, 1949, **23**: 191-3, from abstr. in *Soils and Ferts*, 1950, **13**: 770.

Many specially mixed rose fertilizers would be improved by an increase in their K content, in order to balance the tendency of roses to absorb N at high rates unfavourable to strong growth. Root development and leaf retention are improved by Mg. Various mixtures and organic fertilizers are described in relation to local conditions and seasonal markets.

3099. LYLE, E. W.
Treatment of rose bushes when harvested from commercial fields.
Proc. 4th Annual Rio Grande Valley hort. Inst., 1950, pp. 156-8.

Plants of 5 rose varieties dug on a cool rainy day, transferred immediately to a packing shed and sprinkled there with water, suffered an average loss of 12% in weight in the 28 hours after digging. The difference between bushes that had been cut back hard and lightly was very slight, indicating that most of the loss in weight was from the roots. Work done elsewhere on reducing moisture losses by defoliation and by wax treatments is discussed.—Texas Rose Res. Foundation, Tyler.

3100. MEAHL, R. P.
Soil treatments boost rose production but tend to increase winter killing.
Science for the Farmer, April 1950, being *Suppl.* **2** to *Bull.* **515** (*62nd A.R. Pa agric. Exp. Stat.*), pp. 7-8, illus.

A 5-year manurial trial with roses (H.T. variety Grenoble) showed that plants grown in deeply trenched soil, high in organic matter, were most vigorous and produced the greatest number of flowers and longest stems. Plants grown in loam and sand mixtures produced fewest flowers. Deep trenching and high organic content of the soil, however, increased losses by winter killing.

3101. SYLVÉN, E.
Om några skadedjur i Skåne 1949. **(Some pests in the Swedish province of Skåne in 1949.)**
Växtskydsnotiser, 1949, No. 6, pp. 4-6.

The following pests, among others, are recorded: A dwarf form of *Lecanium corni* on thuja and yew; species of *Bibionidae* on potato; a heavy infestation of the gall midge *Monarthropalpus buxi* on boxwood in one area; and the sawfly *Ametastegia glabrata*, which caused noticeable damage in apples.

3102. KERR, T. W., Jr.
Insecticides for control of certain insects attacking ornamental trees and shrubs.
J. econ. Ent., 1950, **43**: 63-5, bibl. 2.

During 1949 the comparative insecticidal effectiveness of nicotine sulphate and several chlorinated hydrocarbon insecticides was investigated in field tests involving 4 insects attacking ornamental trees and shrubs. Effective control of the holly leaf miner, *Phytomyza ilicis*, was obtained with 2 applications of 2 lb. of wettable 50% DDT in 100 gallons of water, the first made when adult emergence began, the second 13 days later. Chlordan was found inconsistent. Single applications of 40% nicotine sulphate and wettable 50% benzene hexachloride were effective when used at 1 and 2 lb. in 100 gallons of water for control of the woolly beech aphid, *Phyllaphis fagi*. Wettable 25% lindane at ½ and 1 lb., and 50% DDT at 1 and 2 lb. in 100 gallons gave 99 to 100% control of the oak lace bug, *Corythucha arcuata*, in one application. The population of a first instar *Pulvinaria* spp. on yew was reduced by 99% or more by a single application of 40% nicotine sulphate at 1 or 2 lb. in 100 gallons of water. [From author's summary.]—Rhode Island State College, Kingston.

Noted.

3103.
a BUTTERFIELD, H. M.
Growing begonias in California.
Circ. Calif. agric. Ext. Serv. **162**, 1950, pp. 41, bibl. 5.

b BUTTERFIELD, H. M.
Camellia culture in California.
Circ. Calif. agric. Ext. Serv. **164,** 1950, pp. 24, bibl. 4.

c CINI, M.
Osservazioni sull'embriologia di *Nerine rosea* e di *Amaryllis belladonna* (*Amaryllidaceae*). (The embryology of *Nerine rosea* and *Amaryllis belladonna*.) [English summary 8 lines.]
Nuovo G. bot. ital., 1949, **56**: 441-50, bibl. 5, illus.
The embryo sac development in both plants is of the " normal " type.

d DARLINGTON, C. D., AND LA COUR, L. F.
Hybridity selection in *Campanula*.
Heredity, 1950, **4**: 217-48, bibl. 31, illus.

e DIMOCK, A. W.
The nature of carnation diseases and how they spread.
Bull. N.Y. St. Flower Gr, 1949, No. 48, p. 5.

f ELLIOTT, M.
Notes on daffodil acclimatization in Australia.
Gdnrs' Chron., 1950, **128**: 51.

g HIRST, E. L., MCGILVRAY, D. I., AND PERCIVAL, E. G. V.
Studies on fructosans. Part I. Inulin from dahlia tubers.
J. chem. Soc. Lond., 1950, pp. 1297-1302.

h KRÜSSMANN, —.
Deutsche Clematis-Züchtungen. **(German clematis varieties.)**
Dtsch. Baumsch., 1950, **2**: 209-10, illus.

i MINISTRY OF AGRICULTURE, LONDON.
Commercial violet growing.
Adv. Leafl. N.A.A.S. Lond. **352,** 1950, pp. 5.

j MINISTRY OF AGRICULTURE, LONDON.
Commercial anemone growing.
Adv. Leafl. N.A.A.S. Lond. **353,** 1949, pp. 5.

k ROLAND, G.
Recherches virologiques sur *Isoloma hirsutum, Pogostemon patchouli* et *Salvia splendens*. **(Investigation of viruses on *Isoloma hirsutum, Pogostemon patchouli* and *Salvia splendens*.)**
Parasitica, 1950, **6**: 8-13, illus.

SUB-TROPICAL CROPS.

General.

3104. SCHROEDER, C. A.
The effects of climate on fruit form.
Fruit Var. hort. Dig., 1950, **5**: 13-15.
Photographs illustrate the striking effect of climate on the shape of some sub-tropical fruit varieties, grown in different zones of California. For instance, figs from the more humid coastal area near Los Angeles are large, with a long neck and generally light-coloured, whereas fruits grown 70 miles inland in the drier and hotter climate of Riverside are smaller, practically without a neck, dark, and mature considerably earlier. Persimmons in the relatively humid and cool areas near the coast tend to have a smaller length-diameter ratio than fruit from the warmer arid section. Similarly, most citrus varieties grown in the hot, arid interior are longer and more highly coloured than comparable fruits along the coast. The Marsh grapefruit tends to be round when grown on the coastal plain, whereas fruits from the Coachella Valley are distinctly larger, somewhat pyriform and frequently with a slight neck. Internal characters, such as flavour, sugar-acid ratio and thickness of skin, also reflect the influence of climatic conditions. Hence, pomological descriptions of sub-tropical fruit varieties are often quite inadequate.

3105. CITRON, R. H.
Observations of the freeze damage to some sub-tropical fruit.
Proc. 4th Annual Rio Grande Valley hort. Inst., 1950, pp. 26-9.
Frost on 1 February, 1949, in the Rio Grande Valley of Texas caused severe injury to Mexican type avocado varieties which had withstood lower temperatures in California. This is attributed to lack of dormancy, trees being in full bloom at the time. By contrast some old trees of the tender West Indian type with later blooming habit suffered less damage. Seedling avocadoes were less damaged than grafted trees. A discoloration of the cambium layer was characteristic of injured avocado trees, and was also observed in guavas, Cattley guavas, white sapote and Ceylon gooseberry. Guavas in which the trunks had been banked with earth made excellent recovery, as did Ceylon gooseberry. Cattley guava, in spite of cambium discoloration, and white sapote have made some recovery, but more slowly. Earthed-up papaws proved capable of suckering, but unbanked plants were killed outright at temperatures below 30° F.

3106. OPPENHEIMER, H. R.
Frost effects on vegetation in 1948/1949.
Palest. J. Bot. (R), 1949, **7**: 36-40.
The article describes the damage inflicted upon wild and cultivated herbs, vegetables, ornamentals and fruit trees by frosts of exceptional severity in the coastal plain of Palestine in January and February, 1949. With citrus trees and their relatives damage was found to be dependent upon the genetical properties and age of scion and stock, the topography of the land, and the state of care or neglect of the trees. Other fruits mentioned are mangoes, avocadoes, guavas, *Feijoa sellowiana*, *Eugenia pitanga*, *Annona cherimola* and *Eriobotrya japonica*.

Avocadoes.

(*See also* 3105, 3106.)

3107. PREST, R. L.
The avocado in Queensland.
Qd agric. J., 1950, **70**: 32-40, illus.
A general account is given of the cultivation of the avocado, first introduced to Queensland about 30 years ago. Subjects briefly discussed include soil and

climatic requirements, orchard location, pollination and the varieties Fuerte, Nabal and Anaheim, propagation by budding and topworking, planting, cultivation, pruning and harvesting. [A summary of this article appears in *Fruit World, Melbourne*, 1950, **51**: 3: 32-3.]

3108. ROUNDS, M. B.
Report of the avocado variety committee.
Calif. Citrogr., 1950, **35**: 442-3.

Varieties recommended for planting in California are Anaheim, Carlsbad, Fuerte, Hass, MacArthur and Nabal. All, apart from the hybrid Fuerte, belong to the Guatemalan race. Fruit characters of these varieties are tabulated, and new varieties showing promise are mentioned.

Citrus.

(*See also* 2280, 2284, 2315, 2576, 2650, 2653, 2702, 3104, 3106, 3179, 3198, 3372, 3381, 3384, 3390f, 3442.)

3109. ADRIANCE, G. W.
The citrus industry in Italy.
Calif. Citrogr., 1950, **35**: 318, 338-41, 362, 378-9, illus.

Observations on the Italian citrus industry cover such aspects as varieties, soils, sites and windbreaks, cultural practices, orchard layout, pruning, irrigation, pests and diseases, rootstocks and propagation, harvesting and marketing, and citrus products.

3110. LUCIE-SMITH, M. N.
Modern trends in citrus cultivation.
Proc. agric. Soc. Trin. Tob., 1949, **49**: 295-309.

Comparison between operations needed in Californian and Trinidadian citrus groves suggest that costs in the latter should be considerably less. Experience in well-managed Dominica groves show that yields and quality in the West Indies can compare favourably with those obtained elsewhere. Particular emphasis is placed on rootstocks, the tendency now being to select individual parent trees rather than select on a basis of species alone. The advantage of this procedure has been shown in the use of disease-resistant wild grapefruit stocks for limes in Dominica. In Trinidad, where the main stock is the sour orange, which elsewhere has developed the virus disease tristeza, consideration should be given to alternatives. Of types so far tested at St. Augustine none proved equal to the sour orange; the Seville sweet (a sweet-pulped variety of *C. aurantium*) came close as regards yield, the rough lemon was next but made the least congenial bud-union, while wild grapefruit gave the lowest yields and was most susceptible to gummosis. Other types which should be tested are selected strains of the Dominica wild grapefruit, Cacao orange (a wild sweet orange), rough lemon, Sampson tangelo and Cleopatra mandarin. Among other aspects discussed in less detail are the need for windbreaks, especially for limes, cover cropping, tillage by rotary hoes, and the use of fertilizers particularly sulphate of ammonia at rates of 8-10 lb. per mature tree.

3111. LUCIE-SMITH, M. N.
Extracts from a report on a visit to the lime cultivations of Dominica, B.W.I.
Proc. agric. Soc. Trin. Tob., 1950, **50**: 103-9.

Red root disease, apparently identical with "dying-out" in Trinidad, has killed almost all seedling lime trees in Dominica. The industry was revived with budded trees using several rootstocks, sour orange and to a lesser extent rough lemon predominating in the early years, and in recent years a disease-resistant strain of wild grapefruit. The budded limes are now very well cultivated. Temporary windbreaks of *Tephrosia candida* and occasionally *Gliricidia*, and permanent windbreaks of *Calophyllum* sp. or of *Inga laurina* are invariably provided, and contour drainage is usually practised. Plants are set out 25 ft. × 25 ft. bare-root after hard pruning back of shoots and roots. *Tephrosia candida* and occasionally *Canavalia ensiformis* are maintained as cover crops, and mulching is generally practised using *Tephrosia* or *Gliricidia* trimmings, lemon grass (*Cymbopogon citratus*) or bagasse. Manurial practices vary, but trees receive from 0 to 8 lb. of compound NPK fertilizers. Yields on the better estates range from 2 to 3 barrels per tree.

3112. OPPENHEIMER, H. R.
Studies on the reestablishment of citrus groves during the second world war. [English and Hebrew.]
Bull. Rehovot agric. Res. Stat. **54**, 1950, pp. 78 [English, pp. 23], bibl. 13, illus.

The suspension of the export trade during the war had a serious effect on the citrus industry in Palestine. Some groves were neglected, in others trees were cut back to allow intercropping with food crops. From observations on 111 groves that were lopped, various conclusions are drawn, among which are: Reduction of the branch system proved an appropriate method for adapting the trees to a low level of cultivation and care; cutting back in February-April and July-September gave much better results that in May-June; in badly neglected groves medium to heavy pruning proved better than light; Shamouti (Jaffa) trees on sour orange stock suffered less from neglect than those on sweet lime stock, but responses to lopping were similar; differences between scion varieties were inconclusive; whitewashing trunks and limbs had no useful effect except when carried out in May-June; evidence on the value of painting pruning wounds was inconclusive; well-irrigated intercrops were beneficial, whereas no obvious improvement resulted from winter crops or lightly irrigated summer crops. *Experiments:* In one experiment at Rehovot and one at Raananah, neglected trees were subjected to 3 methods of pruning: (1) selective removal of dead wood, (2) general medium-heavy cutting back, and (3) general heavy cutting back to branch stumps. In the first case 4 levels of manure involving ammonium sulphate and sheep manure were superimposed, and in the second 3 levels of cottonseed meal. Results indicate that only relatively small trees reached their previous size again, and that moderate pruning was generally better than heavy pruning. In the Rehovot trial, sulphate of ammonia had a marked, and sheep manure very little, beneficial effect. In the Raananah trial, cottonseed meal improved regeneration but had little effect on yields, which were in any case good in the controls. The report concludes with notes on the rejuvenation of 5 senescent citrus groves and a discussion of work in other countries. Experience in Palestine confirms the view that destruction of weeds is

preferable to the supply of fertilizers, and that moderate cutting back is preferable to heavy pruning. The views of Anderssen [of S. Africa] on the relationship between N supply and stem growth and fruiting [see *H.A.*, 7: 722] are not supported.

3113. ROHRBAUGH, P. W.
Outlook for citrus in the Rio Grande Valley.
Proc. 4th Annual Rio Grande Valley hort. Inst., 1950, pp. 7-13.
The problems and advantages of the area are outlined. Among them is the susceptibility of trees to frost injury, owing to sudden drops in temperature when the trees are in a less dormant condition than are trees in California and Florida at the same time of year. Irrigation water is cheap, but the relatively high contents of salt and boron pose another problem.

3114. REBOUR, H.
Espèces et variétés d'agrumes cultivées en Afrique du Nord. **(Species and varieties of citrus cultivated in North Africa.)**
Rev. hort. Algér., 1950, **54**: 98-103.
Brief descriptions are given of the varieties of sweet orange, mandarin, lemon and grapefruit cultivated in French North Africa.

3115. CHAPOT, H.
Pamplemousses, pomelos ou grape-fruits et tangelos. **(Shaddocks, pomelos or grapefruits and tangelos.)**
Rev. int. Bot. appl., 1950, **30**: 62-75, illus.
The confusion in nomenclature that exists between the shaddock on the one hand and the pomelo or grapefruit on the other is worldwide. The botanical characters of each are here discussed with the aid of diagrams. *C. grandis*, the shaddock, is considered to be a distinct species. It is doubtful, however, if *C. paradisi*, the grapefruit, is a distinct species, and the author inclines to the view that it is a hybrid, probably between the shaddock and orange. The tangelos are hybrids between pomelos and tangerines, the latter themselves being probably hybrids between mandarins and bitter oranges. The main varieties of these different types of citrus are described, and hybrids produced by crosses with other species of citrus mentioned.

3116. ROSS, A. A.
The origin of the Ellendale mandarin and its relatives.
Fruit World, Melbourne, 1950, **51**: 2: 19.
The Ellendale mandarin, now widely grown in Queensland for its excellent quality, originated locally as a seedling. Solid Scarlet and Pride of Ellendale are varieties selected from open-pollinated Ellendale seedlings. The former, though inferior in quality to its parent, has much to recommend it for culture in the Howard-Burrum district.

3117. SINGH, S. N., AND TOMAR, B. S.
Bearing habits of Kaghzi lime.
Indian Fmg, 1949, **10**: 532-8, bibl. 2.
The studies on the Kaghzi lime, *Citrus aurantifolia*, described here were carried out at Kanpur on 6- and 13-year-old trees during 1945-47 and included the following aspects: *Vegetative growth:* New shoots and their further extension, periods of vegetative growth, performance of shoots of different flushes, and behaviour of shoots after flowering. *Floral biology:* Perfect and imperfect flowers, anthesis, dehiscence of anthers and stigma receptivity, pollen viability, self-compatibility and self-incompatibility, size and productiveness of the inflorescences, blooming period, leafy and leafless inflorescences and their productivity. *Fruit study:* Fruit setting and period of ripening.

3118. TAI, E. A.
Producing good citrus nursery trees.
Circ. Jamaica Dep. Agric. **25**, 1949, pp. 23, illus.
Extension Circulars 5 and 6 [*H.A.*, 17: 2480 and 18: 1321] are combined here in a single publication with slight revisions of the text and alterations in the illustrations [the clarity of which is somewhat marred, however, by poor printing.—ED.]

3119. HAAS, A. R. C.
Root growth in citrus seedlings.
Calif. Citrogr., 1950, **35**: 363, 383-5, illus.
Citrus seedlings of several species were grown in soil cultures in which 3 horizons, soil, sand, and gravel, were placed in equal layers but differing relative positions. Best growth of tops and roots was made when the soil formed the top horizon, being underlain by sand and then gravel. Poorest entire-plant fresh weight, except in the case of the shallow-rooted Koethen sweet orange, occurred when gravel on top was underlain by soil and sand successively, and the next poorest when gravel was underlain by sand and soil respectively. Poorest root growth was found when soil in the lowest horizon was overlain by sand, except in the case of the deep-rooted Keen sour orange. The effect of obstructions placed in the centre, but not to the edges, of 3 gal. crocks a few inches below the surface was tested with Brazilian sour orange seedlings growing in loam soil. Poorest top growth resulted from a mixture of smudge oil and soil, and the next poorest from a piece of redwood board. The effect of calcium sulphate (gypsum) was also determined for Brazilian sour orange and Koethen sweet orange seedlings growing in loam soil. With the former, and to a much smaller extent the latter, increased percentages of gypsum in a layer across the centre of the pots were accompanied by increases in Mg and decreases in K absorption in the leaves and decreased K in the roots. Growth benefited slightly from small percentages of gypsum in the soil, but when the tap roots of sour oranges came in contact with a stratum containing a high concentration of gypsum stunted growth with small leaves resulted. When calcium carbonate was used instead of calcium sulphate, no effect on growth was observed. Upon subsequent removal of the stratum rich in gypsum, healthy growth was resumed.

3120. MARTIN, J. P.
Effect of various leaching treatments on growth of orange seedlings in old citrus soils.
Soil Sci., 1950, **69**: 433-42, bibl. 4, illus.
Leaching with rather large amounts of distilled water before planting did not significantly improve growth of sour or sweet orange seedlings in old citrus soils.

Leaching with 2% H_2SO_4 or with 2% KOH, followed by saturation of the soil colloids with calcium or a combination of calcium, magnesium, potassium, and hydrogen, completely overcame the growth-retarding factors in old citrus soil. Similar results were obtained with sand cultures.—Univ. of Calif. Citrus Exp. Stat.

3121. Elze, D. L.
Germination of citrus seeds in relation to certain nursery practices.
Palest. J. Bot. (*R*), 1949, 7: 69-80, bibl. 7.

Seeds of Palestine sweet lime, sour orange, rough lemon and *Poncirus trifoliata* were used in germination studies involving different treatments. Washing the seeds immediately after their extraction from the fruits gave generally better germination than leaving the seeds in rotting fruits mixed with water as is still common practice in citrus nurseries. Infection of fruits with brown rot caused by *Phytophthora* sp. was found to be injurious to the seeds. Storage of picked fruits for several weeks had a delaying effect on germination. Stratification of seeds for 2 weeks in a single layer in pure, coarse sand at a depth of 15 cm. and moistened was generally beneficial. With *P. trifoliata* seeds, both the speed of, and percentage, germination were increased; quicker and more even germination was also obtained with sour orange and rough lemon, but the response of sweet lime was slight. Storage of washed, moist seeds in closed containers mixed with charcoal or dry sand was less satisfactory than stratification. Seeds floating on water showed lower powers of germination than normal seeds; they were most numerous in sweet lime, but even so the proportion was probably too small to justify their separation. Comparing different depths of sowing, 1 cm. gave quicker germination than greater depths, but the usual depths of 2 to 3 cm. would appear to be preferable for practical reasons.

3122. Patt, Y.
The influence of petroleum oils on the germination of citrus seeds and subsequent growth of seedlings.
Palest. J. Bot. (*R*), 1949, 7: 94-102, bibl. 9.

Heavy doses, 1·5 and 0·6 litres per sq. m., of petroleum oil weedkiller No. 2 of the Shell Co. were applied in January to a coarse sand and a sandy loam soil, the oil subsequently being watered in by sprinkler irrigation. In May, soil from these and untreated plots was taken from successive layers 0–2·5 cm., 2·5–5 cm., 5–10 cm. and 10–15 cm. deep, and placed in pots. The germination of sour orange seeds sown in these pots was delayed increasingly by heavier doses of oil, and the effect was more pronounced, the closer the soil had been to the sprayed surface. Few weed seeds germinated with the moderate oil application, while the high concentration delayed germination for at least 1½ months. Leaf colour of the orange seedlings in soil, particularly the upper layers, taken from oiled plots was yellowish, but became normal before the end of the experiment in October. The shape of the seedlings, especially the relation of leaf mass to height, and root growth were not affected, but growth of the shoot was progressively delayed in the loam, but not the sand, with heavier oil application. The results suggest that control of weeds by petroleum oil will cause no serious damage to citrus trees if care is taken not to use excessive doses at one time.

3123. Procenko, A. E.
Prevention of seedling destruction by overheated soil. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 5, pp. 18-20, illus.

Overheated soil surface was found to be the cause of seedlings and rooted cuttings of fruit and forest trees breaking off at soil level. In a trifoliate orange nursery in southern Russia temperatures were taken in July, 1949, and a difference of 38·9° C. was found between air and soil surface temperatures, the soil being 66·5° C. at 1.25 p.m. At a depth of 2–3·5 cm. it was 41° C. A number of shading devices were tested, all of which controlled overheating.

3124. Domato, J.
Normas de orientacion para el uso de nuevos portainjertos de frutales citricos. **(New rootstocks for citrus.)**
Circ. Estac. exp. agric. Tucumán **145**, [1950 ?], pp. 3.

As a result of the order of November 1949 prohibiting the use of sour orange rootstocks in new plantations of sweet orange, mandarin, grapefruit and tangelo, growers should test new stocks. For safety it is suggested that several different stocks should be used in each plantation. Mandarin " Rangpur ", rough lemon, sweet orange " Criollo " and mandarin " Cleopatra " are the stocks best suited to Tucumán conditions. Their properties are described.

3125. Culbertson, J. T.
Progress in lemon bud-wood selection.
Calif. Citrogr., 1950, **35**: 275, 296-7.

A grower describes his experiences over the last 30 years with particular reference to the selection of superior strains of Eureka lemon which led to the development of the Cascade Eureka.

3126. Kimball, M. H., Wallace, A., and Mueller, R. T.
Changes in soil and citrus root characteristics with non-tillage.
Calif. Citrogr., 1950, **35**: 409, 432-3.

Uniform Valencia oranges planted in a deep loam overlying sandy loam at Los Angeles in 1929 received moderate tillage up to 1941. Thereafter part of the orchard was put under non-tillage. Furrow irrigation was used throughout the area up to 1945, when sprinkler irrigation was substituted in the non-tilled area. Root sampling in 1949 and 1950 showed that the dry weight of feeder roots down to 5 ft. in the non-tilled area was double that of the tilled, and the former contained a much higher proportion of feeder roots in the first 12 in. This has necessitated earlier and more frequent irrigation in the non-tilled area. Non-tillage has also resulted in a slight increase in organic matter in the top 6 in. of soil accompanied by a slight reduction in pH, and in much quicker penetration of water. The average yield from 1944 to 1949 was 326 lb. per tree in the tilled block and 413 lb. in the non-tilled, but this may be due to allowing branches in the latter to spread down to the ground. On 19 May, 1950, fruit from non-tilled trees averaged 2·196 in. in diameter compared with 2·090 in. from tilled trees; the former

also contained higher soluble solids and lower acidity, indicating earlier maturity. Further studies are to be made in other areas.

3127. Monselise, S. P.
The carbon dioxide content of the air in a citrus orchard.
Palest. J. Bot. (*R*), 1949, **7**: 81-4, bibl. 13.

The CO_2 content of the air was measured in a citrus grove at Rehovot at different times of year, by means of a conductimetric method. As no significant differences were found in CO_2 content between the inner and outer portions of the tree, averages were calculated from data taken from both points. No significant differences were detected between contents in the morning and afternoon. The results are tabulated, CO_2 being expressed both as mg. per litre air and as percentage of air weight. The average content by day was 0·4646 mg./litre, which is much below values reported earlier for open areas, but is in agreement with the values found by Verduin and Loomis in maize fields in summer. The content by night was 0·5480 mg./litre.

3128. Marloth, R. H.
Citrus growth studies. II. Fruit-growth and fruit internal quality changes.
J. hort. Sci., 1950, **25**: 235-48, bibl. 19, illus.

In general small fruit is associated with heavy crops and *vice versa*, but in some years a dominant seasonal factor upsets the correlation. Young trees on sweet orange stock produced slightly smaller fruit than trees of the same age on rough lemon stock. The critical growth-period of the fruit is the first seven months after setting. After the critical period water deficits brought about a temporary cessation of increase of size, or even a decrease. There were marked diurnal changes in fruit diameter during the first seven months after setting, the size being at a maximum early in the morning and decreasing towards mid-afternoon. After the critical period diurnal changes gradually ceased. Rind thickness showed a direct correlation with fruit diameter after the small immature stage was passed. Fruit from trees on sweet orange stock had initially thinner rind, a higher juice percentage during the maturity period, and a higher critical content of total soluble solids (T.S.S.) in the juice than fruit from trees on rough lemon. The acid content of the juice decreased from immaturity to over-maturity, with a break in rate when the fruit approached full size and the colour changes started. The ratio of T.S.S. to acid in the juice of the fruit was found to follow mainly the changes in acid content, especially just before and during maturity. Due to its higher T.S.S. content, juice of fruit from trees on sweet orange stock had a higher ratio throughout development, reaching any given ratio some four weeks earlier than did the juice of fruit from trees on rough lemon stock.—Subtropical Hort. Res. Stat., Nelspruit, E. Transvaal.

3129. Johnston, J. C.
Orange fruit size survey.
Calif. Citrogr., 1950, **35**: 274, 294-6.

Factors which might influence the size of oranges were studied in a survey of 131 Navel and 298 Valencia orchards over a 5-year period. Two outstanding causes of small fruit were poor physical conditions of soil and inadequate irrigation, the former often being a contributing cause of the latter. No clear correlations were found between fruit size and age of tree, crowding of trees, scaly bark, gummosis, or fertilizers used, with the possible exception of potash. Information on rootstocks and bud sources, on pruning and on the use of lime, gypsum, sulphur, etc., was insufficient or too unreliable to allow comparisons to be made. More and heavier cover crops and more oil sprays were used in the small size group than in the large, and these factors require further investigation.

3130. Stewart, W. S., and Hield, H. Z.
The use of 2,4-D to increase sizes of oranges and grapefruit.
Calif. Citrogr., 1950, **35**: 320, 327.

In trials in 1949, 2,4-D increased the percentage of fruit size 220 per box and larger in Valencia oranges by 36%. The total number of packed boxes was slightly increased and the percentage of first-grade fruit very slightly decreased. [For results with grapefruit in 1948, see *H.A.*, 19: 2399.] The general effect of 2,4-D seemed to be an accentuation of the juvenile characteristics of the fruit: larger size, delayed maturity, dark green colour in young fruit, a thicker fruit stem and a rather rough and pebbly rind up to maturity. The effect was more pronounced on trees 5 to 10 years old than on older trees. Growers are recommended to proceed with caution, applying only one spray and altering the concentration from 16 p.p.m. for fruit 4 to 6 weeks old up to 40 p.p.m. for fruit 12 to 14 weeks old.

3131. Kuznets, G. M., and Jennings, R. F.
Effect of weather on average size and yield of oranges.
Calif. Citrogr., 1950, **35**: 365, 386-7.

Extensive meteorological records kept in Navel and Valencia orange orchards in San Bernardino County, California, since 1911 are discussed. It would appear that size of oranges has been positively affected by the average temperature 16-31 March, by lateness of the date of peak blossoming and by a decreasing trend over time in the average size of oranges. The yield of Navels appears to be related positively to the number of entirely cloudy days, 16 December-16 February, preceding blossoming, average temperature mid-February to mid-March, date of peak full blossom and the time trend, and negatively to the average maximum temperature, 46th to 60th day after full blossom, and the average maximum temperature, 61st to 75th day after full blossom. The results suggest that a more comprehensive study of the effect of weather on size and yield should yield significant results.

3132. Meith, H. C.
In favor of short runs.
Calif. Citrogr., 1950, **35**: 354-5.

Figures are tabulated for 3 NPK trials on oranges which show that irrigation practice had a much greater effect on fruit size than fertilizer treatment. Although the length of irrigation run in each case was only 15 to 16 trees, in 11 cases out of 12 the fruit produced at the end of the run was smaller than that produced at the beginning. The answer is to make the irrigation run as short as possible or to accelerate the flow through the run, reducing it as it approaches the end.

3133. PARKER, E. R., AND JONES, W. W.
Potassium and orange sizes.
Calif. Citrogr., 1950, **35**: 230, 248.

In the early years, 1931-34, of a fertilizer trial at Riverside, California, on oranges which have shown no symptoms of potash deficiency, the effects of K, as sulphate of potash, on fruit size were small and inconsistent. In recent years, 1941-49, K has given an average increase of 6·9% in the proportion of fruit size 220 and larger, and the size of fruit was found to be highly correlated with the concentration of K in the dry weight of the leaves. K did not increase the number of fruits harvested and thus had no effect on fruit set or fruit drop. It produced a slight increase in the total weight of crop and a very slight improvement in the commercial grade. A technical report is to be published in the *Proc. Amer. Soc. hort. Sci.* [actually Vol. 55, pp. 101-13, just received.—ED.].

3134. EDWARDS, C.
Fertilizer trials with grapefruit at Rio Farms, Inc.
Proc. 4th Annual Rio Grande Valley hort. Inst., 1950, pp. 54-7.

In a trial covering 3 years NPK treatments were repeated in 3 blocks, but the author refers to lack of uniformity among the trees in one area [and the arrangement did not allow for proper replication of treatments.—ED.]. Yield responses were contradictory and gave no clear indication of fertilizer effects.

3135. BITCOVER, E. H., AND WANDER, I. W.
Some observations on nitrite formation and the absorption of nitrogen by citrus.
Plant Physiol., 1950, **25**:461-8, bibl. 12, illus.

Twelve trees of Valencia orange budded on rough lemon rootstock were set in coarse (¼ to ⅜ inch) silica gravel. Complete nutrient solutions were used in which the form of nitrogen was varied in different solutions. The forms of nitrogen studied were urea, ammonium, and nitrate. Wilting of trees occurred during the warmest period of the year when the source of nitrogen in the nutrient solutions was in the form of urea. Concomitant with this wilting was a very apparent accumulation of nitrite in these solutions. Experiments demonstrated that relatively high temperatures were a factor in nitrite accumulation, which could be counteracted by sufficient aeration of the nutrient solutions. There was also evidence that urea, ammonium, and nitrate were absorbed by the roots of citrus trees. [Authors' summary.]—Univ. Florida Citrus Exp. Stat.

3136. ALDRICH, D. G., AND TURRELL, F. M.
Effect of soil acidification on some chemical properties of a soil and the plants grown thereon.
Soil Sci., 1950, **70**: 83-90, bibl. 8, being *Pap. Calif. Citrus Exp. Stat.* **635.**

Sulphuric acid was applied to soil of pH 7·0 in pots to adjust acidity in batches to approximately pH 6·0, 5·0, 4·0 and 3·0. The reactions occurring in the soil are discussed. Growth yields of alfalfa grown in these pots declined as the soil became more acid, whereas with 1-year-old sweet orange seedlings the trend was reversed. The composition of the leaves of both types of plant is tabulated. For the orange seedlings the contents of Ca, Mg, K, P, S, and Mn appeared to be adequate at all levels of acidity, and it is assumed that differences in growth must be attributed to the influence of pH on other factors or on the availability of other ions, not investigated. A reciprocal relationship would appear to exist between P and Mg or K, P tending to increase in the leaves with increasing acidity and Mg and K declining. Ca increased in the leaves as the pH dropped to 6·0 but thereafter remained fairly constant. Mn increased gradually at pH 4·0 and rose sharply at pH 3·0.

3137. COHEN, A.
The manganese content of Shamouti orange leaves.
Palest. J. Bot. (R), 1949, **7**: 85-93, bibl. 19.

Analyses were made of Shamouti [Jaffa] orange leaves from trees budded on sweet lime stock, which, in addition to symptoms associated with zinc and magnesium deficiency, showed leaf patterns thought to be due to manganese deficiency. The trees were growing on 4 soil types in the Palestine coastal plain. Leaves taken from trees growing on sand, loamy sand and loam contained an average of 25·6, 30·2 and 32·8 p.p.m. Mn respectively, which were slightly higher than the contents of healthy trees growing on the same soils and must be regarded as normal. Only on a calcareous sand did the average figure, 16 p.p.m. for both chlorotic and healthy trees, fall within the " poverty adjustment range " for Mn. The Mn content of leaves was thus shown to decline with increasing proportions of sand in the soil, which favoured aeration and the oxidative transition of Mn to the tetravalent form. No response was obtained from spraying or injecting manganese sulphate, and this confirmed that the symptoms were not produced by Mn deficiency.

3138. COOPER, W. C., AND EDWARDS, C.
Salt and boron tolerance of Shary red grapefruit and Valencia orange on sour orange and Cleopatra mandarin rootstocks.
Proc. 4th Annual Rio Grande Valley hort. Inst., 1950, pp. 58-79, bibl. 18, illus.

Valencia oranges and Shary red grapefruit on both sour orange and Cleopatra mandarin rootstocks and Cleopatra mandarin seedlings planted in fine sandy loam soil in December 1948, were irrigated during 1949 with water containing 0, 1, 3 and 6 p.p.m. boron with 0 and 5,000 p.p.m. salt added. Clearly distinguished symptoms of salt and boron excesses developed and are described with the aid of illustrations. The presence on the under sides of leaves of tiny pustules distinguish boron excess from zinc and manganese-mottling and from a yellowish hue in grapefruit leaves attributable to salt injury. The Cleopatra mandarin stock proved more resistant to salt than the sour orange, and the Valencia scion than the Shary red grapefruit. No consistent rootstock effect has so far been found on boron tolerance.—U.S. Dep. Agric. and Texas agric. Exp. Stat.

3139. SMITH, P. F., REUTHER, W., AND SPECHT, A. W.
Mineral composition of chlorotic orange leaves and some observations on the relation of sample preparation technique to the interpretation of results.
Plant Physiol., 1950, **25**: 496-506, bibl. 15.

Studies are described on methods of washing samples

of leaves preparatory to analysis. Methods compared were wiping with cheese-cloth, scrubbing in tap water, in HCl, in a neutral detergent (Dreft) and in an acidulated detergent solution. The effects of these treatments were determined on the mineral content of green and chlorotic orange leaves. With unsprayed leaves, total Fe, Al and Cu were reduced to minimal values by scrubbing in neutral detergent solution followed by adequate rinsing. Na was absorbed from the detergent solution by chlorotic, but not by healthy, leaves. No other element tested was affected. Where leaves had been sprayed with Cu and Zn plus lime, acidulated detergent solution gave the lowest analytical values for these elements, but it is doubtful, even so, if all surface contamination was removed. Grinding the leaf samples in a mechanical mill did not appreciably alter their composition. In leaves cleaned with detergent a strong inverse relationship was found between total Fe and the degree of iron chlorosis. Severely chlorotic leaves contained 10 to 15 p.p.m. total Fe, mildly chlorotic 18 to 30 p.p.m. and non-chlorotic 35 to 100 p.p.m. The chlorotic leaves also had an abnormally low Mn content.—U.S. Dep. Agric., Orlando, Florida, and Beltsville, Maryland.

3140. Haas, A. R. C.
The relation of phosphorus to creasing and puffing in Valencia oranges.
Calif. Citrogr., 1950, **35**: 277-8, 298-300, bibl. 12, illus.

Several studies on the role of phosphorus in the nutrition of citrus are reported. (1) In controlled cultures with a moderately high nutrient level and uniform P it was found that, as the nitrate concentration of the solution increased, total P decreased in the leaves of Valencia oranges and increased in the fruit peel. (2) In Valencia orange trees on sweet orange stock and Marsh grapefruit trees on sweet orange and pummelo stocks in the field, total P in the fruits decreased slightly in the early part of the year and then increased materially during the latter part of the growing season. With Valencia oranges, total P in the dry matter increased with advancing maturity in both peel and pulp; K also increased and Ca decreased in the peel. The inner portion of the peel contained less P than the outer. (3) Valencia trees on rough lemon stocks were grown in cultures with uniform N and varying P concentrations. At low levels of P deficiency symptoms occurred in the leaves and are described with the aid of photographs. As P was increased up to 62 p.p.m. in the culture solution the quality and yield of fruit improved; the peel became thinner, smoother, less pebbly or coarse, and symptoms resembling the " acorn " or stubborn virus disease disappeared. At 77 p.p.m. P, however, the peel became so thin that the inner portion developed splits resulting in the physiological disorder known as " creasing and puffing ". It is pointed out that in the field this disorder is most liable to occur when rough lemon is the rootstock and when picking is delayed. The effect of excess P with other rootstocks is now being studied.

3141. Palti, J., and Awner, Z.
The effect of sodium isopropyl xanthogenate on Shamouti oranges.
Palest. J. Bot. (*R*), 1949, **7**: 179-80.

Before proceeding with large-scale experiments with n.i.x., which in preliminary trials has shown promise as a herbicide in citrus groves, tests were made to determine its effect on the Shamouti [Jaffa] orange. Characteristic of the effect of n.i.x. spray was its strict localization; only leaves or fruits actually covered were scorched and shed, a specific abscission effect which merits further study. It is concluded that, used as a herbicide, there would be little danger of injury to the trees if reasonable precautions were taken, especially as such spraying could be done in winter and spring when the efficacy of the material would be reduced by lower temperatures.

3142. Lombard, T. A.
Eucalyptus windbreaks *vs.* lemon production.
Calif. Citrogr., 1950, **35**: 301.

Figures are given for lemon yields per row over 5 years, which suggest that up to 6 rows nearest to an unpruned eucalyptus windbreak were adversely affected by the windbreak. [The uniformity or otherwise of the soil is not mentioned.—Ed.]

3143. Rohrbaugh, P. W., and Maxwell, N. P.
Findings of the citrus freeze committee.
Friend, W. H.
Pruning freeze damage citrus trees.
Proc. 4th Annual Rio Grande Valley hort. Inst., 1950, pp. 19-23, illus., and pp. 24-5.

Injuries to bark and wood following freezing in January 1949 are described briefly, and recovery and treatment discussed. The committee suggest that pruning or treatment should be postponed until injured trees have completed at least one cycle of growth, after which the extent of any injury should be clear. Normal watering and fertilizer programmes should be followed, though fertilizer amounts may be decreased where trees have been considerably reduced in size. In pruning back to living wood all wounds over ¾ in. should be sealed with a good wound compound. In general, pruning has a dwarfing effect and should be confined to the removal of parts that imperil the health of the trees. As a postscript to the committee's report it is noted that fruit which set after the freeze was of unexpectedly good quality. In some places sunburn damage, with killing of bark on the south-west sides of trunks, followed pruning.

3144. Bartholomew, E. T., Sinclair, W. B., and Horspool, R. P.
Freeze injury to citrus fruit.
Calif. Citrogr., 1950, **35**: 276.

A brief summary is given of a study on the effects of freeze damage in 1948-49 to Valencia oranges and grapefruit. Details of results are to be published shortly as a bulletin of the University of California.

3145. Wallace, J. M., and Bitters, W. P.
The quick decline disease.
Calif. Citrogr., 1950, **35**: 322, 350-1.

The history, nature and symptoms of quick decline of citrus are described. Shown to be a virus disease, it can be transmitted by budding, but attempts at transmission by juice inoculation have been unsuccessful. It is concluded that insect vectors are responsible for natural spread, and in Brazil *Aphis citricidus* has been found to transmit the similar or identical tristeza virus; this aphid does not, however, occur in California, and

up to the present transmission tests with many native insects have given negative results. In California, only sweet orange on sour orange rootstock has been observed with absolute certainty to be affected by quick decline; however, the disease has been found in trees which appear by bark tests to be budded on grapefruit, and experimental inoculations of grapefruit on sour orange stock has produced symptoms suggestive of quick decline. Regardless of rootstock, lemons have so far remained free, and sweet orange on sweet orange, rough lemon and trifoliate orange appear not to be injured though they can act as symptomless carriers. In control experiments, inarching with sweet orange and rough lemon seedlings produced definite improvement in 4 years, but the degree of improvement was not sufficient to salvage the diseased trees. Bridge grafting proved ineffective. Topworking affected trees with lemon proved satisfactory provided the entire sweet orange top was eliminated.

3146. Teague, C. P.
Protect young trees from gummosis.
Calif. Citrogr., 1950, **35**: 250-1, illus.

Apart from high planting to keep soil around the trunks of young citrus trees dry, care should be taken to keep paper protectors dry and to allow aeration within the wrap. The bark of the lower 12 in. of trunk may be protected by bordeaux paste or, where fumigation is to follow, by a 5-1-4 zinc-copper-lime mixture.

3147. Gayford, G. W.
Orchard notes.
J. Dep. Agric. Vict., 1950, **48**: 169-70.

Notes on (1) citrus spraying: bordeaux mixture for septoria spot, and citrus pit, (2) collar rot in citrus: cutting out decayed bark and coating the cuts with bordeaux paste, (3) apricot diseases: black heart caused by *Verticillium* sp.; the affected limbs should be removed and the cuts covered with bordeaux paste.

3148. Minz, G.
A starch test to aid in the pruning of citrus trees affected by *Diplodia*.
Palest. J. Bot. (*R*), 1949, **7**: 184-5, bibl. 1.

Applying the IKI starch test to the cut surface of Shamouti orange branches showed that branches killed by *Diplodia natalensis* had become devoid of starch and that a correlation existed in still living tissues between the presence of the fungus and the disappearance of starch. The starch test could be used as a guide in pruning affected trees to eliminate *Diplodia*.

3149. Wager, V. A.
Spraying for the control of black spot in citrus.
Fmg S. Afr., 1950, **25**: 226-8, bibl. 1, illus.

The results of a series of spraying experiments, made between 1944 and 1948, in Natal and the Transvaal, against black spot caused by *Phoma citricarpa* are outlined. The most suitable and economical material so far tested is 2-1-80 bordeaux mixture plus a casein spreader. The first application should be made at two-thirds petal drop and two further applications at 6-week intervals, oil replacing the spreader in the third spraying for scale control; occasionally 4 applications at monthly intervals may be advisable. Using 10 gal. spray per tree for the 3 sprayings the cost works out at 1s. 2¼d. The same spray programme controls melanose and sooty blotch. Other precautions suggested are the removal of neglected smooth lemon trees which are more susceptible to attack than oranges, and the stripping of leaves from nursery plants before these are sold to prevent the spread of latent infection.

3150. Littauer, F., and Nadel-Schiffmann, M.
Control of brown rot in citrus fruits with nitrogen trichloride.
Palest. J. Bot. (*R*), 1949, **7**: 181-2, bibl. 2.

Tests on artificially and naturally infected fruit of orange and grapefruit show that NCl_3, applied at the rate of 1 mg. per cu. ft. air for 6 hours, is effective in controlling brown rot caused by *Phytophthora* sp. only if applied to the fruit within about 24 hours after inoculation.

3151. Minz, G., and Gutter, J.
***Sclerotium bataticola* as a potential pathogen of various citrus fruits.**
Palest. J. Bot. (*R*), 1949, **7**: 182-4, bibl. 1, illus.

Sclerotium bataticola Taub. from fruits of Shamouti orange and grapefruit were found capable of inducing rot in fruits of Shamouti and Valencia orange, grapefruit, lemon and sweet lime. Symptoms are described.

3152. Rubin, B. A., Archovskaja, E. V., and Ivanova, T. M.
The significance of the oxidizing process in the resistance of citrus to fungal infection. [Russian.]
Doklady Akad. Nauk S.S.S.R., 1948, **60**: 1009-12, bibl. 7 [received 1950].

In this study of oxidation in ripening fruit in relation to infection by *Penicillium italicum*, the composition of the gas within the fruit was found to be different from that in the surrounding air, a result of the feeble penetration of gases through the skin. This creates special conditions for the action of oxidizing enzymes which must be adapted to conditions where there is little oxygen. It is considered that the study of the oxidizing enzymes of citrus fruits is of great theoretical and practical interest.

3153. Woglum, R. S.
The black fly in Mexico.
Calif. Citrogr., 1950, **35**: 229, 255-7, 276, 302-4.

Observations are given on the extent of infestation by black fly, *Aleurocanthus woglumi*, in Mexico and the campaign to control and eradicate it. The spray formula recommended in Mexico is light-medium emulsible oil 1 litre, cubé powder with 5% rotenone content 35 g., water 59 l. Another promising preparation is 1¾ lb. DDT, 2 qt. kerosene, 2 qt. xylene and 4 oz. blood albumin spreader to 100 gal. water.

3154. Shaw, J. G.
Hosts of the citrus blackfly in Mexico.
Publ. U.S. Dep. Agric., agric. Res., Administ. Bur. Ent. Plant Quar. **E-793**, pp. 16, bibl. 4.

The citrus blackfly (*Aleurocanthus woglumi* Ashby) is well established in parts of Mexico. Its development from egg to adult was observed on 74 species of plants in 38 families. These plants are listed with the common names in English and Spanish.

3155. Cooper, J. F., and Plummer, C. C.
Developments in citrus blackfly control.
Proc. 4th Annual Rio Grande Valley hort. Inst., 1950, pp. 94-9, bibl. 11.

Tests with various insecticides are outlined. Apart from parathion which is so toxic to man as to be of questionable value, the most effective preparations so far found are per 100 gal. water: (1) 1·67 gal. light-medium emulsive spray oil containing per gal. 4·5 oz. cubé root with a 5% rotenone content, and (2) 1·75 lb. DDT, 2 qt. xylene, 2 qt. ordinary kerosene and 4 oz. blood albumin spreader. Trials indicate that two properly timed applications a year should give commercial control.—U.S. Dep. Agric., Bur. Ent. Plant Quar.

3156. Wene, G. P.
The citrus fulgorid.
Proc. 4th Annual Rio Grande Valley hort. Inst., 1950, pp. 90-3, illus.

A brief account is given of the citrus fulgorid, *Oremsis pruinosa*. Say, first noticed in 1942. Following frost defoliation in January 1949, it did considerable damage in a lime orchard, and subsequently, in other heavily infested orchards, its presence was associated with an increase in fruit drop. Good control was obtained with 1% parathion dust applied with a rotary hand duster, and with 20% tetraethyl pyrophosphate, 1 pint to 10 gal. water as a spray to 6 trees, or 0·66% dust at 1 lb. per tree, both applied with a buffalo turbine. 0·5% parathion and 5% DDT-80% sulphur were less effective, and sulphur alone exerted no control.

3157. Spencer, H., and Osburn, M. R.
Control of the citrus rust mite.
Fmrs' Bull. U.S. Dep. Agric. **2012,** 1950, pp. 8, illus.

To prevent russeting of citrus fruit caused by *Phyllocoptruta oleivora*, growers should dust the trees with sulphur according to a schedule that will give year-round protection. A spray programme using lime-sulphur, wettable sulphur or both may be used if preferred. Schedules for dusting and for spraying with lime-sulphur are given.

3158. Gressitt, J. L., and Djou, Y. W.
Introduction to the study of citrus scale insects and their biological control in China.
[Chinese with English summary 1 p.]
Spec. Publ. Lingnan Univ., Canton, China, **13,** 1950, pp. 19.

Information is given on the more important scale insects of citrus and their parasites and predators, with a table of entomophagous insects reared from scale insects on citrus, showing the parasite species, host insect, and the province in China where found.

3159. Pruthi, H. S.
A foreign insect menace to Indian citrus industry checked.
Indian Fmg, 1950, **11**: 5-6, illus.

A well-illustrated note is given on the fluted or cottony cushion scale, of which there was a serious outbreak on citrus and other plants in the Nilgiris and Pulneys in 1941. In 1946, steps were taken to multiply and distribute some of its natural enemies, notably the beetle *Rodolia cardinalis* and the moth *Euzophera cocciphaga*, and as a result the pest has been almost eradicated in Coorg and Bombay provinces and its spread to other provinces has been checked.

3160. Omer-Cooper, J., and Whitehead, G. B.
Studies on the biological control of red scale in Eastern Cape Province. 1. Introduction. 2. The Golden chalcid. 3. Ladybirds.
Citrus Gr., 1950, No. 195, p. 3, 12, bibl. in text; No. 197, p. 9; and No. 198, pp. 3-4.

Investigations suggest that in the Sundays River Valley the Golden chalcid, *Aphytis chrysomphali* Merc., exerts a considerable measure of control over the citrus red scale, *Aonidiella aurantii* Mask. Another chalcid, the indigenous *Habrolepsis rouxi*, is too rare in the Eastern Province to be of much service. The second article gives a popular description of the nature of the parasitism by the Golden chalcid. In the third article the percentages of 6 species of ladybird found in 6 citrus orchards are tabulated.

3161. Turrell, F. M., and Chervenak, M. B.
Metabolic products of elemental sulfur 35 applied to lemons as an insecticide.
Reprinted from *Advances Chem. Ser.*, 1950, **1**: 250-9, bibl. 22, being *Pap. Calif. Citrus Exp. Stat.* **629.**

The present paper carries the authors' study of the causes of elemental sulphur injury to lemon fruits a step farther [see *H.A.*, 20: 1923 and 1924]. They summarize their results as follows: Interference with conduction or radiation of heat from leaves or fruit during insolation increases the temperature of the plant part; linear temperature increases the rate of volatilization of elemental sulphur logarithmically; hydrogen sulphide production of sulphur-dusted lemons increases nearly linearly; and sulphur dioxide production of sulphur-dusted lemons increases linearly with increase in temperature. The sulphur content of the cell solution of the peel of sulphur-dusted lemons when determined as sulphate was shown to correlate with the increase in sulphur of " sulphur-burned " sides of peel of lemons injured on the tree. Using radioactive elemental sulphur, hydrogen sulphide, sulphur dioxide, and sulphuric acid to treat lemons incubated at insolation temperatures (41° to 44° C.) it was shown that radioactive hydrogen sulphide and/or sulphur dioxide was produced, that the percentage of sulphur determined as sulphate in lemon peel increased, and that the pH of water extracts of the peel decreased. The specific activities of the acid-soluble peel proteins were relatively high, whereas the specific activities of the alkali-soluble proteins were relatively low. There appeared to be a destruction of proteins in some of the treatments.

3162. Stofberg, F. J., and Anderssen, E. E.
Effects of oil sprays on the yield and quality of Navel and Valencia oranges.
Sci. Bull. Dep. Agric. S. Afr. **296,** being *Ent. Ser.* **29,** 1949, pp. 19, bibl. 7, price 3d.

The results are described of two experiments carried out over 7 to 8 years at two widely separated localities. At Fort Cox, on both Navels and Valencias, single oil sprays were applied in January or April with HCN fumigated trees as controls; the oil, applied at a concentration of 1½%, was heavy-medium with a viscosity of 87°. At Nelspruit the same two varieties

were sprayed with a similar heavy-medium oil and also with a light oil of viscosity 59°, both oils being applied at 2% concentration, the controls again being fumigated. The Navels received single applications in December, April and July (after picking); the Valencias received light oil in December and April and in both, or heavy-medium oil in December plus light oil in April. With both varieties all the oil sprays, especially the heavy-medium oil and the double applications to Valencias, either reduced or retarded yield, total solids, acid and fruit colour, and to a slight extent vitamin C content. There was no effect on weight per fruit or on rind thickness, nor was there any clear cumulative effect as regards yield and fruit composition, although at Nelspruit there was inconclusive evidence suggesting a possible residual effect on the yield and fruit colour of Navels. Significant seasonal variations occurred, but these differences could not be correlated with any of the treatments. There was some indication that a certain amount of leaf drop occurred on both varieties following the application of either type of oil, especially in hot weather, and also that dead wood was more abundant in trees receiving heavy-medium oil or two spray applications. Perhaps the most important aspect is the danger of excessive reduction in total solids below the permissible export minimum, which would result in delayed picking and loss of fruit, particularly Navels, through dropping.

3163. Baines, R. C.
Citrus-root nematode investigations.
Calif. Citrogr., 1950, **35**: 344-5, bibl. 1, illus.

A brief review is given of some studies on the root nematode of citrus. The amount of damage caused has not yet been determined, but inoculated sour orange seedling trees were 12% shorter than clean trees one year later. Optimum soil temperature for development of the nematode is between 77° F. and 88° F.; below 59° F. and above 95° F. it becomes quiescent. In the field it persists in fallow land for over 3 years. Many citrus species and varieties and related plants are susceptible and a number of these are mentioned. Variation has been found between strains of *Poncirus trifoliata*, some being highly resistant, others very susceptible. Tests in Valencia orange orchards with soil fumigants such as ethylene dibromide and D-D have not given satisfactory results.

3164. Marh, A. T., and Feljdman, A. L.
The biochemical changes of the flavone glucosides of citrus fruits. [Russian.]
Biohimija (Biochemistry), 1950, **15**: 230-5, bibl. 10.

The biochemical change of the flavone glucoside naringin in citrus fruit itself, and in relation to the chemical purity of preparations, has an oxidation-reduction character and is catalyzed by peroxidase.

3165. Maurer, R. H., Burdick, E. M., and Waibel, C. W.
Distribution of naringin in Texas grapefruit.
Proc. 4th Annual Rio Grande Valley hort. Inst., 1950, pp. 147-51, bibl. 8.

Naringin, the bitter principle causing the characteristic flavour of grapefruit, was determined in 1948 for the fruit of 12 varieties and mutations harvested on four dates in Texas. The most significant change occurred between 13 October and 17 November, naringin contents showing declines of 45 to 66% in the flavedo, albedo, juice, section membranes and core. Juice with a naringin content of 0·070% still possessed an immature bitter taste though conforming to legal maturity standards for acid and Brix. Below 0·050% the flavour of the juice was superior. No changes in naringin content were detected during processing. Further studies on naringin content in relation to maturity and respiration during storage are in progress.

3166. Douglass, C. D., Gage, T. B., and Wender, S. H.
The ultraviolet spectrum of naringin by use of the Beckman model DU spectrophotometer.
Proc. 37th annu. Mtg Okla Acad. Sci. for 1948, 1950, pp. 67-70, bibl. 5.

The ultraviolet spectrum of naringin has been determined by using the Beckman Model DU spectrophotometer. The maxima obtained (285 and 330 millimicrons) were found to be in disagreement with those recorded in the literature. An attempt was made at further purification using paper partition chromatography. An impurity was encountered which interfered with the absorption of naringin in the ultraviolet region. Methods are described in which attempts to eliminate this impurity were made. [Authors' summary.]

3167. Bradford, E. A. M.
Mechanized fruit-packing in Morocco.
Food, 1950, **19**: 265-7, illus.

A new, fully mechanized packing station and preserving factory " SCUPA " at Casablanca is described. Citrus fruits and tomatoes are the main products. The packing house can handle 200 tons of fresh fruit a day; the preserving factory can utilize 150 tons.

3168. Anon.
Chain saws—practical orchard tools.
Calif. Citrogr., 1950, **35**: 388-9, illus.

Two saws used to remove mature citrus trees are described briefly. One is a 12-in. electric chain saw that can be used in one hand by one man; with one man cutting and one man piling the brushwood, the branches, up to 5 in. in diameter, can be removed from about 60 trees per day. The second is a 36-in. petrol-driven unit operated by two men, who can cut about 40 large stumps per day.

Dates.

(*See also* 2280, 3198.)

3169. Nixon, R. W.
Observations on the bayoud disease of date palms in Morocco.
Plant Dis. Reptr, 1950, **34**: 71-3, bibl. 6.

An account of observations made, and information obtained, during an ecological study of date varieties in French North Africa. The best varieties of date appear to be most susceptible. The Medjool is threatened with extinction. The Bou Feggous, probably the most widely planted variety in Morocco and in the nearby oases of western Algeria, is almost as susceptible and has been greatly reduced in numbers. One of the least esteemed varieties, Bou Slikken, is said to be one of the most resistant. The disease

appears to be most serious where soil and water conditions are most favourable for date culture. It is called bayoud (white) because of the characteristic colour of affected leaves. There is evidence suggesting that it is caused by *Fusarium albedinis*, and that it is commonly transmitted through the roots. Man is believed to have been the chief vector, for it would be easily transmitted by offshoots from affected plants.—U.S. Dep. Agric., Indio, California.

Litchi.

3170. Li, L.-Y., and Li, C.-S.
An improved method of air-layering lychee trees. [Chinese, English summary 1½ pp.]
Fukien agric. J., 1949, **11**: 1-6, bibl. 10, illus.

Air-layering [marcottage] is more commonly used in S.E. China than approach or ordinary grafting or seed to propagate the litchi. In marcotting, a complete ring of bark about 1 in. wide is removed from a branch ½ to 2 in. in diameter and a mud ball, containing rotted plant material, applied around the ring 3 days later and the whole covered with palm fibres, rice straw or a split bamboo pot. This operation is done in mid-March just before, or at, the time of blossoming. The rooted plants are generally removed about 100 days later, in the autumn. In a small trial at the Fukien Christian University, damp sphagnum moss wrapped in a thick sheet of heavy tung-oil paper was used instead of the usual mud ball. In as little as 40 days, without watering, all marcots were found to be well rooted. Treatment of some of the rings with indole-butyric acid had no additional effect. [From English summary.]

3171. Roy, R. S., and De, B. N.
Control of litchi mite.
Indian J. Hort., 1950, **7**: 1: 16, bibl. 2.

In 1949 at Sabour, mites, *Eriophyes* sp., attacked the Bedana litchi but left nine other varieties alone. Good control was obtained by spraying with 0·5% DDT.

Lungan.

3172. Fang, C., Chou, C.-Y., and Li, L.-Y.
A preliminary study of the quality of lungan fruits grown in Putien and Foochow. [Chinese, English summary 1½ pp.]
Fukien agric. J., 1949, **11**: 37-44, bibl. 9, illus.

As part of the survey referred to in *H.A.*, 20: 1034 11 varieties of lungan, *Euphoria longana*, collected in Foochow were studied, and this paper reports their morphological characters, dates of maturity, and uses. Three varieties are classed as early ripening, namely, Tsao-Pai, a dessert type, and Hsieh-Yeh Nan-Yuan and K'uo-Yeh Nan-Yuan, which are used for confectionery. Main crop varieties include K'ai-Yang, Shih-Chieh and Po-Li-Chang which are of good quality, Hung-Herh-Tze which is particularly suitable for jam-making, and two very poor varieties Chu-Kerh and Chi-Tze. Of two varieties classed as late, Ch'iu-Fun-Pai is a good dessert variety and Ta-Pao-Yang is eaten both fresh and dried. In general the lungan is one of the main commercial fruits in the Fukien and Kwangtung provinces of S.E. China. It possesses a fairly high feeding value, containing 15-20% total sugars, 60-100 mg. ascorbic acid per 100 g. flesh, and low acidity. It is better adapted to hilly land than the litchi, and produces a hard wood commonly used in making high-grade furniture. [From English summary.]

Papaws.

(*See also* 3105, 3386.)

3173. Chandrasekaran, S. N., Madhuram, G. H., and Sundararaj, D. D.
Half-apocarpy in *Carica papaya* Linn.
Curr. Sci., 1950, **19**: 186, bibl. 4, illus.

A plant in the Botanic garden, Coimbatore, has been found producing fruits with the carpels fused at the base and free towards the ends, hence the description " half-apocarpous ".

Passion fruit.

3174. du Preez, D.
The granadilla or edible passion fruit.
Fmg S. Afr., 1950, **25**: 223-5, bibl. 4, illus.

The ordinary purple, medium-sized granadilla is the variety considered here. Vines can be propagated by cuttings, but seed is the usual method. Climatic and soil requirements, and the preparation of the land to permit irrigation, are described. 10 ft. × 10 ft. spacing is considered suitable. The vines can be trained on trellises consisting of 4 or 5 wires one above the other or of 3 parallel wires attached to a T-piece on top of posts 5 to 6 ft. high. In a small-scale trial at Bien Donné, pruning was found to decrease yield in the two succeeding seasons, as compared with no pruning. An examination of yield figures from this trial suggests that yields of 10 to 15 tons per morgen could be expected. Pests and diseases are mentioned briefly.

3175. Menon, H. B.
Cultivo de las parchitas. **(Granadilla culture.)**
Agric. venezol., 1949, **13**: 133: 28-32, bibl. 6, illus.

The author considers that the production and processing of granadillas (*Passiflora* spp.) could become a valuable industry in Latin America. The climatic and soil requirements of the plant, the methods of propagation and culture practised in various parts of the world, in particular Australia and Kenya, the main pests and diseases, and the utilization of the fruit are discussed.

Persimmons and other Diospyros spp.

(*See also* 3104, 3351.)

3176. Kerharo, J., and Bouquet, A.
Sur quatre *Diospyros* africains utilisés dans la pharmacopée indigène de la Côte d'Ivoire (Haute-Volta). **(Four African species of *Diospyros* used in native medicine in the Haute-Volta region of the Ivory Coast.)**
Rev. int. Bot. appl., 1949, **29**: 601-5.

The local names and brief descriptions are given of *Diospyros kekemi* Aubr. et Pellegr., *D. mespiliformis* Hochst., *D. monbuttensis* Gürke, and *D. xanthochlamys*

Gürke. A preliminary examination of material sent to Paris suggests that these species are worth consideration as sources of plumbagin and for their antibiotic power and possibly other properties.

3177. SANDWITH, N. Y.
Contributions to the flora of tropical America: L. Dr. Ducke's collections of *Diospyros* in Amazonian Brazil.
Kew Bull., 1949, No. 4, pp. 481-93.
Twenty species of *Diospyros* are described, five of them new.

3178. MEZZETTI, A.
Altre osservazioni sulla "defogliazione del kaki". **(Further* observations on leaf fall in kaki.)** [English summary 13 lines.]
Ann. Sper. agrar., 1950, **4** (N.S.): 291-4.
The presence of this disease is now reported from widely separated districts in Italy from the Province of Brescia in the north to that of Naples. It is found to attack chiefly the type of kaki known as *lycopersicum* while trees of the *costata* group appear to be resistant. It is believed [though not as yet proved] that it is caused by a virus. Its course is generally for 1 to 2 years, after which it disappears. The suggestion is made that nitrogen should be applied in spring and bordeaux sprayed about mid-May.

Pistache.

3179. CROSSA-RAYNAUD, P.
Quelques enseignements à tirer d'une mission arboricole en Italie. **(Some lessons learned on a fruit-growing tour of Italy.)**
Tunis. agric., 1949, **50**: 127-31.
In addition to observations on varieties of almond and citrus grown in Italy, notes are given on the propagation of the pistache in Sicily. The terebinth tree, *Pistachia terbinthus*, is used as a rootstock, and budding is done at the beginning of summer during the course of a short rest period when the flow of gum at the point of incision is less than normal. In Tunisia, where budding has given such poor results as to make the establishment of pistachio orchards impossible, there is either no such rest period or it has not been determined accurately; studies are now to be made on this aspect. Yields in Sicily are generally low, due to there being only one or two male trees per ha.

Sweet potatoes.

(*See also* 3425.)

3180. MASSA, L.
La batata o patata dolce d'America. Sua coltivazione ed utilizzazione in Italia. **(Cultivation and utilization of the sweet potato in Italy.)**
Riv. Agric. subtrop., 1950, **44**: 73-8, bibl. 3.
Various forms of the sweet potato are grown successfully in N.E. Italy, for direct human consumption, for cattle food, or for extraction of flour. Considerable impetus was given to cultivation for flour extraction during the war; the process of extraction is detailed here. One fact urged in its favour by the Italian writer is that every operation in its cultivation is done by hand, which means the absorption of large labour forces.

* For previous note, see *Ibid.*, 1947, **1** (N.S.): 425-30; *H.A.* 18: 2537.

Tung.

3181. KILBY, W. W., AND POTTER, G. F.
Tung culture in southern Mississippi.
Bull. Miss. agric. Exp. Stat. **464**, 1949, pp. 35, bibl. 2, illus.
Among the points discussed in this circular are the following: Sites and soils with particular reference to drainage, water holding capacity, fertility, slope and soil reaction. Land preparation, and especially contour planting. Varieties of budded tung, stratifying seed, and budding technique. The planting and cultivation of orchards including types of machinery used, and cover crops and their management. For manuring, particular emphasis is placed on the need for both N and P for young non-bearing trees. Results of a manurial trial are tabulated for 5 years in which 5 varieties received N with different combinations of P, K, Ca and Mg and for another trial in which N was supplied at different rates. These show that bearing trees continued to respond to a high level of N provided P was not deficient, but that, whereas young trees showed little response to K, as cropping increased K was liable to become depleted, as indicated by leaf composition and serious declines in the oil content, and therefore the value, of the fruit (see also *H.A.*, 19: 1516). Effects of Zn deficiency and the manuring of cover crops are also discussed. Other points referred to are pruning, including cutting back and notching to stimulate branching, and the harvesting and storing of the fruits.

3182. LOUSTALOT, A. J., GILBERT, S. G., AND DROSDOFF, M.
The effect of nitrogen and potassium levels in tung seedlings on growth, apparent photosynthesis, and carbohydrate composition.
Plant Physiol., 1950, **25**: 394-412, bibl. 11.
A study is reported in which 3 levels of N and K in factorial combinations were obtained in leaves of tung seedlings growing in sand culture. At the last harvest of plants the contents of N were 2·59, 1·95 and 1·38% and of K 1·40, 0·93 and 0·50%. As the nitrogen content, first of the N_1 plants and later of the N_2 plants, fell to about 2·00% a change in foliage colour was noted, and the rates both of apparent photosynthesis and of growth declined. When N in the leaves fell to 1·60 or to 1·40%, photosynthesis was at a very low level, linear growth stopped, many leaves abscissed and increase in dry weight almost ceased. Reducing the K content of the leaves to about 0·55% failed to produce leaf symptoms and caused smaller reductions in rates of apparent photosynthesis and growth than did the low levels of N. Whereas N deficiency reduced the rate of apparent photosynthesis to about the same extent morning and afternoon, K deficiency depressed it to a greater extent in the afternoon, owing, it is thought, to an increased rate of respiration during the warmest part of the day. Although low K was associated with reduced photosynthesis and growth, there was a concomitant increase in reducing sugars, and a decrease in non-reducing

sugars, particularly in the roots. Possible explanations of this effect are discussed. Low N tended to be associated with low levels of non-reducing sugars and high levels of reducing sugars in the leaves, but the effects on stems and roots were less consistent. Starch accumulation in the leaves appeared to be most rapid at N_1K_3 and N_3K_1, which suggests that a low level of one of these elements in the presence of a high level of the other checked growth more than photosynthesis.—U.S. Dep. Agric., Gainesville, Florida.

3183. Kilby, W. W., and Greer, S. R.
Rates of fertilizer on tung.
Circ. Miss. agric. Exp. Stat. **150,** 1949, pp. 7, illus.

Eight years' results are given of an experiment in which M-1 [selected] tung trees planted on deep Savannah soil received 8-8-4 fertilizer annually at rates of 0, ¼, ½ and 1 lb. per tree. In each year a winter cover crop was sown, and worked in the following spring; the cover crop received 300 lb. basic slag per acre annually for the first 5 years and thereafter 500 lb. For the first 3 years fertilizer had no effect on cropping, but since then there have been significant differences in yield between all treatments, the yield of trees receiving 1 lb. being about double that of the controls. Growth as measured by the gain in cross sectional area of the trunks showed similar responses. Costs of production and profits are tabulated and discussed in the light of these findings. In the last 5 years all fertilizer applications showed increased net profits, the profit being more than doubled most years by the use of 1 lb. of fertilizer.

3184. (American Fertilizer.)
Eight-year study of tung fertilization.
Amer. Fert., 1950, **112**: 20, from abstr. in *Soils and Ferts*, 1950, **13**: 1622.

In Mississippi, 1 lb. of fertilizer per tree should be applied at planting time, and the rate of application in subsequent years increased by 1 lb. each year up to a maximum of 1,000 lb./acre. 6-8-4 fertilizer should be used the first 3 years and 12-8-8 or its equivalent in subsequent years. Newly planted trees should be fertilized in the spring, the fertilizer being worked in within 15 inches of the trunk. For established trees, the fertilizer should be worked in the area between the outer spread of the branches between January and blossom time. The P and K may be applied to a leguminous cover crop at the time of planting.

3185. Webster, C. C., and Wiehe, P. O.
Die-back of tung trees.
Plant Dis. Circ. Nyasaland **1,** 1950, pp. 4 [mimeographed], from abstr. in *Rev. appl. Mycol.*, 1950, **29**: 339.

Tung trees (*Aleurites montana* and *A. fordii*) in Nyasaland are affected by a die-back caused by a species of *Botryosphaeria*. Recently the disease has become markedly more prevalent. The twigs and branches of affected trees suddenly wilt, usually early in the growing season. The fungus lives within the infected branch and spreads to the trunk. Externally the bark of an affected branch is dark brown, and it soon becomes shrunken and withered. The wood is brown or yellowish-brown; broken streaks pass into the living wood for a distance of several inches beyond the brown lesions on the bark. Later, spores form in small black pustules scattered over the surface of the dead wood. All infected branches should be cut to a point where no brown dots are found in the living wood. The cutting implements should be dipped in a 1 per cent. lysol solution between cuts, which should be effected before leaf fall, preferably while the trees are dry. All cut surfaces should be painted at once with warm fungicidal paste. The severed stems should be burnt.

3186. Large, J. R., Painter, J. H., and Lewis, W. A.
Thread blight in tung orchards and its control.
Phytopathology, 1950, **40**: 453-9, bibl. 5.

Thread blight (*Corticium stevensii* Burt. = *Pellicularia koleraga* Cke) has infected 10 commercial tung orchards in the southern United States. The disease is recognized by dead leaves hanging by threads of fungus, particularly in late summer and early autumn. It has been found on a number of native plants in swamps, and clearing these species from areas adjacent to the orchard may sometimes be advisable. Control by pruning is feasible if the disease is limited to a few branches or trees, but is impracticable otherwise. Controlling the disease in severely infected orchards adjacent to swamps containing diseased native plants will require at least one spray per season of 6-6-100 or 6-2-100 bordeaux mixture applied between late May and early July.—U.S. Field Laboratory for Tung Investigations, Bogalusa, Lousiana.

3187. Cutting, C. V.
The nature and uses of tung oil; a brief survey.
Nyasaland agric. quart. J., 1949 (published April 1950), **8**: 53-65.

A general description is given of the chemical nature of tung oil, together with the methods of evaluating the oil itself and the materials in which it is used.

Other crops.

3188. Locke, L. F.
The Chinese jujube: A promising fruit tree for the southwest.
Okla Crops and Soil, 1947, being *Exp. Stat. Bull. Okla agric. Exp. Stat.* **B-319,** 1948, pp. 78-81.

The Chinese jujube (*Zizyphus jujuba*) is a little-known fruit in the south-western United States. The author records its performance at the Southern Great Plains Field Station, Woodward, Okla, and at other State Experiment Stations in the district. Four large-fruited selections have been grown there for periods of up to 25 years, and have cropped well and very regularly. They blossom late enough to escape the danger of spring frosts, and are more resistant to drought than other deciduous fruit trees. They thrive best in areas with long, hot summers. The fruit has a very high food value that compares favourably with that of figs and dates; it is likely to be most popular dried or candied. It is considered advisable that only home plantings should be made until a market for the fruit has been developed.

3189. HOWES, F. N.
The Chinese tallow tree (*Sapium sebiferum* Roxb.)—a source of drying oil.
Kew Bull., 1949, No. 4, pp. 573-80, bibl. 10.
The tree and its distribution are described. It grows easily from seed and also from root suckers or cuttings. It is not browsed by cattle, is frost-hardy and stands a certain amount of shade. To run wild it appears to need a fairly heavy rainfall or a moist soil. In China the fruits are harvested only where trees are abundant, the tallow, the preparation of which is described, being used for candles and tapers and to a lesser extent for soap-making and in dressing cloth. The kernel oil (Stillingia oil), an analysis of which is tabulated, is used in China as an illuminant and in preparing varnishes; it also possesses emetic properties. As a potential source of drying oil and indirectly of tallow the prospects are not promising, because of the labour involved in collecting the ripe or ripening fruits. It has, however, been found useful in India for fixing the sides of ravines and river banks and in areas where soil erosion is severe it may be worth consideration.

3190. TULLIS, E. C., AND DAVIS, W. C.
Persistence of 2,4-D in plant tissues.
Science, 1950, **111**: 90, bibl. 3, illus.
Chinese tallow trees, *Stillingia sebifera* Michx., sprayed with, and injured by, 2,4-D in the summer of 1948, continued to show characteristic injury symptoms in new growth produced the following spring. By contrast treated chinaberry trees, *Melia azedarach* L., severely injured in 1948, showed no injury symptoms in the following year.—U.S. Dep. Agric., Beaumont, Tex.

3191. CHEVALIER, A.
Les *Nitraria*, plantes utiles des déserts salés. **(Species of *Nitraria*, useful plants for saline deserts.)**
Rev. int. Bot. appl., 1949, **29**: 595-601, bibl. in text.
The literature relating to the genus *Nitraria* is reviewed, and 4 species and 3 sub-species described briefly. The fruits of these small shrubs are eaten by the natives of a number of countries in Asia and Australia. Trials should be made to see if they can be grown in the Sahara.

3192. CHEVALIER, A.
Sur de nouveaux *Teclea* de l'Afrique occidentale. **(New *Teclea* species found in West Africa.)**
Rev. int. Bot. appl., 1950, **30**: 75-8, bibl. 4, illus.
Six species of *Teclea* (Rutaceae) found in West Africa are described, three of them being illustrated.

Noted.

3193.

a CONNELL, J. J., AND OTHERS.
Grapefruit and lemon gums. Part I. The ratio of sugars present in the gums and the structure of the aldobionic acid (4-D-glucuronosido-D-galactose) isolated by graded hydrolysis of the polysaccharides.
J. chem. Soc. Lond., 1950, pp. 1696-1700.

b DEBACH, P.
Natural control of citrus pests in Texas and Florida.
Calif. Citrogr., 1950, **35**: 410-34.

c FLANDERS, S. E., GRESSITT, J. L., AND DEBACH, P.
Parasite of Glover's scale established in California.
Calif. Citrogr., 1950, **35**: 254-5, bibl. 11.

d HASANAIN, S. Z.
The wild plant wealth of Pakistan and its value in plant breeding.
Agric. Pakistan, 1949-50, **1**: 76-81.

e LEWIS, H. C., AND SCHILLING, W. E.
Spread of citrus red mite [*Paratetranychus citri*] into interior districts.
Calif. Citrogr., 1950, **35**: 364, illus.
Following the use of DDT.

f LITTAUER, F., AND GUTTER, J.
Mass spore production of *Diplodia natalensis* and some other fungi pathogenic to citrus fruits.
Palest. J. Bot. (*R*), 1949, **7**: 174-6, bibl. 2.

g SELTZER, R. E., AND ROWELL, J. D.
Prices and markets for desert grapefruit.
Calif. Citrogr., 1950, **35**: 435-6.
A summary of an extensive investigation.

h SMIT, B.
Control of soft scale [*Coccus hesperidum*].
Fmg S. Afr., 1950, **25**: 144, 176.
General recommendations.

i SMITH, H. S., AND FLANDERS, S. E.
The search for natural enemies of citrus pests.
Calif. Citrogr., 1950, **35**: 362, 376, 378, bibl. 3.

TROPICAL CROPS.

General.

(*See also* 3391, 3413.)

3194. TEMPANY, H. A.
Agricultural problems of the Colonial dependencies.
J. Sci. Fd Agric., 1950, **1**: 99-104, bibl. 32.
The subjects discussed are: Plantation agriculture and peasant agriculture; the need for surveys, physical factors; climate and its effects; soils; fertilizers and manures; mixed farming; plant breeding, control of pests and diseases; agricultural research.

3195. DE CARVALHO, D.
Brazilian agriculture.
[*Publ.*] *Brazilian Govt. Trade Bur., Montreal*, [undated], pp. 16.
A lecture given by the Minister of Agriculture in July 1949 on the agricultural economy of Brazil and the development and problems of the industry.

3196. LLOYD, W.
Alcune note sulla Malesia. **(A note on Malaya.)**
Riv. Agric. subtrop., 1950, **44**: 12-17.

An account is given of the history, geography, climate, geology and ethnology of Malaya and its agriculture, with notes on the cultivation of cacao, oil palm (*Elaëis*) and hevea.

3197. WILLS, J. McG.
Horticultural districts of Queensland. 3. The South Coast.
Qd agric. J., 1950, **70**: 209-17, illus.

A general account is given of the climate, soils, vegetation and horticultural uses of the tract of country extending from the Queensland/N.S.W. border to the Logan river, about 20 miles south of Brisbane. Crops described include bananas, passion fruit and pineapples, the commonest banana varieties being Mons Marie and the very similar, if not identical, Williams Hybrid and to a lesser extent Cavendish and Lady Finger. Minor fruits include the strawberry variety Phenomenal, the papaw and the Macadamia or Queensland nut, the propagation problems of which remain unsolved. Vegetables grown for local markets are also listed.

3198. LAMBARDI, N.
Yemen: agricoltura e pastorizia, sfruttamento del regno animale e vegetale, denominazioni arabe locali. **(Yemen: its agriculture and the exploitation of its animal and vegetable products, and their Arabic names.)**
Riv. Agric. subtrop., 1950, **44**: 26-46.

Among other items of information are notes on the cultivation of tobacco, coffee, khat (*Catha edulis*), date palm, grapevine, citrus, banana, mango, papaw and tamarind.

3199. S., E. H. G.
Oil palm plantations in Nigeria and the Belgian Congo: bananas in the British Cameroons: cultural and disease situations.
Col. Plant Anim. Prod., 1950, **1**: 72-3.

A note on a report by Professor C. W. Wardlaw arising out of a tour in 1948 and issued privately by the United Africa Company under the title: "Notes on a visit to the Cameroons, Nigeria and the Belgian Congo."

3200. RAMDAS, L. A.
The micro-climates of plant communities.
Poona agric. Coll. Mag., 1950, **40**: 4: 17-36, bibl. 11, reprinted from *Indian Ecol.*, 1946, Vol. **1**, No. 1.

Micro-climatic records taken at Poona over the last 10 years are discussed and results obtained in other parts of India considered. Among crops used in the studies were sugar cane, tobacco, grape-vines and betel vines as well as field crops.

3201. MAYNE, J. E.
An approach to mechanization in tropical agriculture.
Trop. Agriculture Trin., 1950, **27**: 9-13, bibl. 5.

A general discussion is given of the problems besetting mechanization in the tropics. The manufacturing countries do not yet fully appreciate the difficulties. Many machines exist of potential value to the tropics, but the approach to mechanization should be a cautious one, the logical stages being trial and selection, modification where necessary, the development of new agricultural techniques where necessary and the development of advisory services.

Bananas.

(*See also* 3197-3199, 3402.)

3202. DODDS, K. S.
The breeding of disease-resistant bananas.
World Crops, 1950, **2**: 56-8, illus.

There are encouraging indications from work in Trinidad and Jamaica that new varieties of banana will be raised with the desirable characteristics of the Gros Michel but with resistance to both Panama disease and leaf spot. The progress so far made is reviewed in this article.

3203. VENKATARAMANI, K. S.
A note on the banana variety, "Moongil".
Reprinted from *Madras agric. J.*, 1948, **35**: 402-5, bibl. 7.

A description is given of the comparatively rare banana "Moongil" or "Ottamukil" found in S. India. It has points of similarity with the "Nendran" group of bananas.

3204. MITCHELL, J. H.
Banana plantation management, with particular reference to the one bunch-one sucker-straight follow through system.
Qd agric. J., 1950, **70**: 255-61, illus.

After describing different types of planting material, corms, bits and suckers, the author outlines the method of pruning practised by the better growers on the near north coast of Queensland. The method, which is applied primarily to the Cavendish and Mons Marie varieties but is also applicable to Lady Finger, involves saving all follower suckers in a plantation at the same season. This is done just before the parent plant bunches about 12 months after planting, and generally the best month for planting is also the best month for setting followers. The first follower should be set across a slope rather than up-hill, and as far as possible in a south-easterly direction, as the parent tends to throw its bunch towards the north. The second ratoon sucker should subsequently develop in the same direction, i.e. more or less in line with the previous season's sucker and the parent plant. All unwanted suckers should be pruned each month. They are usually cut off a few inches above ground, a small central portion of the butt is gouged out and about one-third of a teaspoonful of paraffin poured into the hollow.

3205. O'CONNOR, B. A.
The banana scab moth, *Nacoleia octasema* Meyr., and its control.
Agric. J. Dep. Agric. Fiji, 1949, **20**: 84-6, bibl. 2.

The banana scab moth whose life history is described does considerable damage to banana fruits in Fiji. Trials suggest that DDT dust, applied after careful removal of the bracts when the bunch has bent over to a horizotal position, would be more reliable and cheaper than pyrethrum dust. Laboratory and field trials with chlordan and DDT emulsions have also given promising results, although to obtain complete

control it will probably be necessary to follow spraying, just before the outer bract unfolds, by dusting when the bunch has become horizontal.

3206. REINKING, O. A.
Description of banana troubles observed.
Plant Dis. Reptr, 1950, **34**: 66-8, bibl. 12.
Banana diseases observed in British North Borneo are discussed under (1) Banana mosaic (?) which causes chlorotic streaks of yellow and green running from the mid-rib to the edge of the leaf. (2) Infectious chlorosis (?) with distinct chlorotic streaks on the leaf blade. (3) Banana bunchy-top complex, showing a general yellowing of younger and older leaves. Research problems are outlined.—N.Y. State Agricultural Experiment Station, Geneva.

3207. CHITTENDEN, A. E., AND COOMBER, H. E.
The suitability of banana trash from Jamaica as a paper-making material.
Col. Plant Anim. Prod., 1950, **1**: 64-7.
Tests on samples of banana trash (dried leaves and petioles) from Jamaica showed that these would only produce paper of generally poor quality and appearance. Because of the high soda consumption needed it is doubtful if it could be pulped economically by the soda process.

Cacao.

3208. MONTSERIN, B. G.
The evolution of modern trends in cocoa cultivation.
Proc. agric. Soc. Trin. Tob., 1949, **49**: 283-91.
A general account is given of some of the landmarks of cocoa research, with special reference to selection for high yields and disease resistance.

3209. PALMA, M.
Algunas notas sobre el cultivo del cacao en Venezuela. **(Notes on cacao production in Venezuela.)**
Agric. venezol., 1949, **13**: 133: 40-4, illus.
This paper, read at the Cacao Conference held in London in September 1948, deals with the history of the cacao industry in Venezuela, areas of production, types grown, the most serious pests and diseases, and the main lines of research being carried out. The future of the industry in that country is being threatened by witches' broom disease, high costs of production and instability of prices. It is only by breeding high-yielding types of the traditional excellent quality that cacao production can remain an economic proposition.

3210. MCLAUGHLIN, J. H.
Observations on cacao in Ecuador.
Cacao Inf. Bull., 1950, **2**: 4: 1-5.
The observations cover the major cacao-producing areas and the attempts being made to revive the industry. A variation from the conventional method of propagation is mentioned: 200 cuttings dipped in hormone solution are set in bins about 1 m. × 2 m., covered with burlap but no glass, left untouched for 30 days, and then hardened off *in situ* by raising the lids 1 in. per day for 6 days; shade over the nursery is maintained at 40%, and 70 to 90% rooting is said to be obtained consistently. Large-scale expansion of ICS clones is taking place. Of diseases, witches' broom is present in all plantations, as are pod rots, though there is some confusion regarding the several species of fungus involved.

3211. ANON.
The Bahia cacao zone.
Cacao Inf. Bull., 1950, **2**: 4: 5-7, map, abstracted from *Mon. Rep. Bahia Cocoa Trade Comm.*, 1950, **1**, No. 2.
A map shows the main areas of production in Bahia, Brazil, which is the largest producing area in the western hemisphere. A total of 270,000 hectares containing 210 million trees is under cultivation. Production per tree is 1 to 2 lb. of dry beans, with 3 lb. in exceptional cases, but new strains developed by the Bahia Cacao Institute at Urucuca, which usually yield about 6 lb., will soon be available in quantity. Research is to be expanded and attempts made to eradicate the *formiga de enxerto*, the graft ant, which causes much loss of production.

3212. EVANS, H.
Results of some experiments on the preservation of cacao seed in viable condition.
Trop. Agriculture Trin., 1950, **27**: 48-55, bibl. 2, illus.
Experiments on the storage of cocoa pods and of cocoa beans under tropical conditions have shown that the important factors involved in storage are free access of air and low rate of water loss. These conditions have been achieved by storage in finely powdered charcoal of relatively low moisture content. Cocoa beans have been successfully established as seedlings after 13 weeks' storage in perforated tins in charcoal of 30-35% moisture content. For shorter periods of 14 days or so good germination was obtained by merely wrapping pods in tissue or waxed paper. Waterproofing by smearing with vaseline before wrapping in waxed paper markedly reduced germination.—Cacao Res. Scheme, Trinidad.

3213. NAUNDORF, G., VILLAMIL, G. F., AND MEDINA, J.
Contribucion al estudio de la fisiologia de la germinacion del cacao (*Theobroma cacao* L.). Primera nota: Las substancias activas e inhibidoras y su influencia en la germinacion. **(A contribution to the study of the physiology of cacao seed germination. I. The effect of growth promoting and growth inhibiting substances on germination.)** [English summary ¾ p.]
Not. agron. Palmira, 1950, **3**: 63-86, bibl. 49.
In experiments carried out at the Agricultural Experiment Station, Palmira, it was found that the concentration of growth substances in the seeds of cacao was above optimal, and that a 24-48 hour extraction of these substances resulted in increased growth of the primary root and hypocotyl and a more rapid formation of lateral roots; their growth, however, was later inhibited as a result of a lack of these substances. During germination the auxin content of the cotyledons increased up to the 8th day; in the endosperm it increased up to the 5th day and then decreased slowly. Treatment of the seeds with synthetic growth substances did not affect their germination capacity or the growth of the primary root or hypocotyl. A 63% increase in lateral root formation was recorded, however. Of the

substances contained in cacao seed, theobromine, caffeine, tannins, catechin and tartaric acid were found to have an inhibiting action on the germination of wheat seed, although the germination of cacao seed in the pod is not inhibited.

3214. Naundorf, G., and Villamil, G. F.
Contribucion al estudio de la fisiologia del cacao (*Theobroma cacao* L.). Segunda nota: Tratamientos con fitohormonas y su influencia sobre la caida prematura y marchitamiento de los frutos jovenes. **(A contribution to the study of the physiology of cacao. II. The effect of growth substance treatment on premature fruit fall and cherelle wilt of the young fruits.)** [English summary 11 lines.]
Not. Agron. Palmira, 1950, **3**: 87-90, bibl. 4.

The results of earlier investigations [see *H.A.*, 20: 400] suggested that hormone action might be an important factor in the problem of premature fruit fall and cherelle wilt of cacao. In further experiments at the Agricultural Experiment Station, Palmira, it was found that treatment of the flower cushions with 2% alpha-naphthaleneacetic acid in lanolin paste increased the trouble, although a paste containing 1% of the potassium salt very slightly reduced it. A spray of beta-naphthoxyacetic acid in 0·2% solution, however, followed a week later by a spray of a 0·05% solution of the potassium salt of alpha-naphthaleneacetic acid, substantially reduced the amount of fruit fall.

3215. Galley, R. A. E.
The control of cocoa diseases in West Africa.
World Crops, 1950, **2**: 189-93, bibl. 3, illus.

The damage caused by capsid bugs and their control on young plants by 2½% DDT emulsion are described briefly, but the major part of this article is devoted to the virus disease "swollen shoot". Apart from the cutting-out programme and removal of alternate host trees of the mealy bug vector, the author suggests the possibility of controlling the vector by means of systemic insecticides. The possible reduction of virus symptoms by means of chemotherapeutical agents should also be explored. The difficulties of application in the closely spaced and haphazardly planted cacao plantations are discussed, but neither systemics nor chemotherapeutical agents should need such uniform application as the ordinary contact insecticides.

3216. Phillis, E.
Temperature during cocoa fermentation.
Proc. agric. Soc. Trin. Tob., 1948, **48**: 223-5 [omitted in error from *H.A.*, 19].

Studies on the fermentation of cacao beans indicate that a two-stage temperature curve is the normal behaviour. The first stage in which temperatures reached about 37°-38° C. lasted for up to 4-5 days and may possibly be regarded as an anaerobic phase. In the second stage temperatures rose suddenly to 52°-54° C. and during this phase, which must be regarded as aerobic, occurred the changes in the bean which are associated with "fermentation". However, for about two weeks at the height of the season the first stage disappeared and temperatures rose rapidly to well over 50° C. and the corresponding physical changes occurred earlier. This change from a two-stage to a one-stage temperature curve was simulated by storing pods for a week before opening. The need for the first low temperature phase was indicated in beans taken in the early stages and sweated in an incubator at over 50° C. for several days; they failed to swell or develop colour or aroma.

Cinchona.

(*See also* 3387.)

3217. Scarrone, F.
Exploitation commerciale des quinquinas du Cameroun. **(Commercial utilization of cinchonas in the Cameroons.)**
Rev. int. Bot. appl., 1949, **29**: 564-70.

About 95% of the cinchona in the French Cameroons is *C. succirubra*, the remainder being *C. ledgeriana* and hybrids. The first trial shipment of ungraded Succirubra bark to France in 1947 was not well received. In 1948 the material was graded into strips at least 25 cm. long and fragments of 8 to 25 cm., both of which contained an average of 8% alkaloid, and into a general grade with fragments of 2 to 8 cm. containing about 5% alkaloid and a debris grade of material under 2 cm. containing 3% alkaloid. The last category, making about 20% of the total, is of no use to the drug industry, and the general grade, accounting for about 30%, would only be saleable in times of shortage. In this respect Succirubra compares unfavourably with Ledgeriana with its high alkaloid content, but Ledgeriana is a much weaker growing tree ill-adapted to native methods of cultivation. The problems posed by this state of affairs are discussed. Trials in progress at the Quinine experimental station at Dschang suggest that Succirubra used as a rootstock for Ledgeriana imparts vigour to it, and there is also the possibility of finding hybrids which combine the vigour of one with the high alkaloid content of the other.

Cloves.

(*See also* 3420.)

3218. Williams, R. O.
The clove industry of the Zanzibar Protectorate. Parts I and II.
World Crops, 1950, **2**: 143-5 and 198-200, bibl. 1, illus.

In the first article the author outlines the history of the industry, the export trade in cloves and clove oil, pruning, planting and picking, crop seasons and fluctuating yields and the adverse effects of bad drainage. The second article is devoted mainly to the "sudden death" disease, thought now to be of virus origin, which has remained unidentified and uncontrolled for over 50 years. Usually only relatively old trees are affected, and attempts are being made to isolate infected patches by cutting out diseased and contact trees. In replanting it is suggested that wider spacing be adopted with cacao interplanted.

3219. Robb, R. I.
Laboratory trials with some of the newer insecticides against a scale insect (*Saissetia* species).
E. Afr. agric. J., 1950, **15**: 227-8.

In laboratory tests on the *Saissetia* species found on cloves both Rentemul (a thiocyanate wash) and Pestox (bis(dimethylamino)phosphonous anhydride) gave good control, and Fosfern 20 (E605) showed promise against

newly-emerged scales and as an ovicide. Four other insecticides were less effective.

Coconuts.

3220. CHILD, R.
The coconut industry of Ceylon.
World Crops, 1950, **2**: 102-6, illus.

Coconuts covering some 1,200,000 acres are one of Ceylon's main crops, and the history and chief features of the industry are here described. Products include coconut oil and copra, desiccated coconut, coir products, coconut cake and coconut shell charcoal. Yields average about 1,500 nuts per acre per annum, but would be higher if planting had not expanded onto unsuitable soils. Pests and diseases are mentioned briefly.

3221. ANON.
Coconuts.
Nyasaland agric. quart. J., 1949 [published April 1950], **8**: 76-9.

A brief account is given of the cultivation of coconuts, in which it is noted that in Tanganyika productive groves have been successfully established at 4,000 ft. at Tabora.

3222. MENON, H. B.
El cocotero enano y sus grandes posibilidades en la America tropical. **(The dwarf coconut and its great possibilities in tropical America.)**
Agric. venezol., 1949, **13**: 135:32-4; 136:26-8; 137: 54-7, bibl. 12, illus.

The dwarf coconut, thought to be a mutant of the tall form originating in Java or Sumatra, is much grown in Malaya, Southern India and the Philippines, but very little in tropical America. It will thrive, however, in any region suitable for the production of the common coconut, and because of its dwarf stature, early bearing and great productivity, the author considers that it should be introduced into the economy of this region. Detailed directions for its culture, including control of pests and diseases, are given. Seed of the best commercial varieties would have to be obtained from Malaya and sown 30 cm. apart, horizontally, in nursery rows 50 cm. apart. Beds should be irrigated when necessary, kept clean of weeds and rogued of unhealthy plants. After 3-5 months the seedlings should be planted out, preferably in the rainy season, into well-prepared ground with a spacing of 8×8 m. A circle of 3 ft. radius round the trees must be kept clean cultivated, but the rest of the plantation may be left to produce weed cover or sown with legumes. Abundant manuring is required to give the best results, for a mature tree will produce from 100 to 300 nuts annually. Finally, the author lists some of the numerous uses of the coconut and points out its potential value to the economy of tropical America.

3223. VIADO, G. B., AND BIGORNIA, A. E.
A biological study of the asiatic palm weevil *Rhynchophorus ferrugineus* (Oliver), (Curculionidae, Coleoptera).
Philipp. Agric., 1949, **33**: 1-27, bibl. 11, illus.

Although this paper is largely devoted to a study of the life history of *Rhynchophorus ferrugineus*, a serious pest of coconuts in the Philippines, observations were also made on other palm species attacked and on possible control measures. It is suggested that efforts should be made to avoid wounds, which are common points of entry for the weevil. Similarly this weevil also often gains entry through holes made by the palm weevil, *Oryctes rhinoceros*, and control of the latter should indirectly reduce attack by *R. ferrugineus*. Finally, the use of kaong palm trunks, *Arenga pinnata*, as traps gives promise as a control measure.

3224. MENON, K. P. V., SANKARA-SUBRAMONY, H., AND PANDALAI, K. M.
Investigations on diseases of the coconut palm in Travancore-Cochin state: studies on soil conditions in relation to disease incidence.
Indian Cocon. J., 1950, **3**: 81-7, 99-105, bibl. 16.

Studies on various pathogens found in association with the wilt or root disease of coconuts were described in an earlier paper [*H.A.*, 20: 2007]. In this paper studies are described on soil samples representing areas in the three main coconut soil types of Travancore and Cochin, in which the disease has become prevalent. The disease shows the same symptoms irrespective of locality and soil types. Compared with healthy areas analyses of soil from around diseased trees show a very low level of fertility. The major plant foods, particularly K, are very low, as are values for base exchange properties; the clay and silt fractions are below 6%. Periodic waterlogging may be a contributory factor in many diseased areas, and the possibility of a trace element deficiency being an additional factor is being investigated.—Central Coconut Res. Stat., Kayamkulam.

Coffee.

(*See also* 3198, 3412, 3433.)

3225. GILBERT, S. M.
Coffee: an export staple of East Africa.
World Crops, 1949, **1**: 152-4, illus.

The present position and future of the industry is discussed with special reference to conditions in Tanganyika. Plant improvement has been largely based on seed selection of robusta coffee in Uganda, the grafting of selected arabica strains in Kenya, and on arabica clones propagated from cuttings in Tanganyika. With the last named a high mortality during the hardening off process remains a drawback. Among cultural improvements outstanding success has followed the use of mulches and the adoption of multiple-stem pruning. Irrigation has been found beneficial in some areas, but with manuring little success has followed the use of artificial fertilizers. Other points mentioned include the lack of progress with regard to tillage operations or shade trees.

3226. NAUNDORF, G.
Contribucion a la propagación vegetativa del café. Enraizamiento des estacas de café con el "método de la planta madre". Primera nota. **(Vegetative propagation of coffee. I. Rooting of cuttings by the "mother plant" method.)** [English summary 4 lines.]
Not. Agron. Palmira, 1950, **3**: 97-101, bibl. 17, illus.

By use of the " mother plant " method the author was able to obtain a 90% rooting of coffee cuttings within a month. Such good results have not been obtained by any other method. Two shallow cuts were made in the stem of semi-lignified shoots while still on the tree, and were smeared with lanolin paste containing 1% or 0·4% α-naphthaleneacetic acid. The wounds were then covered with damp cotton or moss and wrapped in impermeable paper. When callus formation started, after about a week, the cuttings were separated from the parent plant and planted out in a propagating bed of sand. It was found that 0·4% α-naphthaleneacetic acid gave the best results; the higher concentration resulted in too vigorous callusing and inhibited root formation.

3227. Maher, C.
Soil conservation in coffee.
Mon. Bull. Coff. Bd Kenya, 1950, **15**: 283-6, diagrams.

Preliminary observations are given on soils and methods of terracing, mulching, contour planting, cover cropping and cultivation practised or under trial in Kenya. In considering alternative methods emphasis should be laid in this low rainfall area on combining moisture conservation with prevention of soil erosion. Experiments to be laid out at Jacaranda Estate include run-off trials, trials with small and large terraces and trials with alternative methods of contour planting; the proposed layouts of these plots are shown diagrammatically. The grasses *Hyparrhenia rufa*, *Panicum maximum* and *Beckeropsis uniseta* are being studied as possible alternatives to elephant grass for mulching.

3228. Pereira, H. C., and Jones, P. A.
Maintenance of fertility in dry coffee soils.
E. Afr. agric. J., 1950, **15**: 174-9, bibl. 9, reprinted in *Mon. Bull. Coff. Bd Kenya*, 1950, **15**: 303-6.

In times when cattle manure and labour were plentiful it is probable that good yield responses were obtained from frequent heavy applications. To-day neither the manure nor the labour is available in quantity, and the results of 5 experiments are cited to show that applications of small dressings of organic manure are ineffective. Rainfall is insufficient to support both cover crops or weeds and coffee, and clean cultivation promotes very high soil temperatures with consequent loss of organic matter and soil structure. Trash mulching has been found in 5 trials over 1 to 7 years markedly to increase coffee yields and to produce significant differences in both dry and water-stable crumb structure after a single year. Problems connected with the turning in of old mulches and with the control of weeds that eventually grow through mulches are discussed.

3229. Pereira, H. C.
Further observations on the yellowing of coffee.
Mon. Bull. Coff. Bd Kenya, 1950, **15**: 262-3.

Examination of trees with yellow and green foliage during the severe drought of 1949 confirmed the general picture in the former of over-cropping the previous season with exhaustion of carbohydrate reserves. Available moisture in the soil under yellow trees was substantially greater than under green, indicating the reduced power of the former to produce new roots and absorb moisture. Foliage of yellow trees was found to contain considerably less N, P, and Mg than that of green trees, but there was little difference in Ca and K levels. The tissues of green trees contained 50% more reducing sugars, and the roots contained more starch. The large differences in Mg content are to be further studied.

3230. Fraselle, J.
Observations préliminaires sur une trachéomycose de *Coffea robusta*. **(Preliminary observations on a tracheomycosis of *Coffea robusta*.)**
Bull. agric. Congo belge, 1950, **41**: 361-72, bibl. 5.

In 1949 at Yangambi a disease was noticed on Robusta coffee, which, starting as a more or less general chlorosis of the leaves followed by scorching, resulted in die-back of the branches. In some blocks up to 30 or 40% of the trees were killed. The symptoms of the disease both external and internal, and the organism, which appears to be a strain of *Fusarium oxysporum*, are described. It would appear that certain clones are resistant and the use of these probably offers the best means of control. Other methods are being investigated.

3231. Dadant, R.
Sur une nouvelle maladie du *Coffea robusta* en Nouvelle-Calédonie. **(On a new disease of *Coffea robusta* in New Caledonia.)**
Rév. gen. Bot., 1950, **57**: 168-76, illus., from abstr. in *Rev. appl. Mycol.*, 1950, **29**: 363.

The disease, apparently caused by a species of *Thielaviopsis*, causes the leaves of Robusta coffee to turn yellow, hang down, dry uniformly, and fall off after 7 to 14 days, followed by the death of the tree. Intense, widespread blackening of the wood accompanies the first outward symptoms, though the centre of the wood is not usually discoloured. Newly-cut trees not yet killed emit an odour resembling that of acetone or alcoholic fermentation. Affected trees usually occur singly. The disease was first noticed at Sarramea in February 1948, since when it has been found in every coffee-growing area in New Caledonia, though in a less severe form. Inoculations of wounded Robusta and Arabica trees gave positive results, the former dying in 4 months. Guavas have also been found infected.

3232. Rayner, R. W.
Quality and onion flavour in relation to washing, over-ripeness and other factors.
Mon. Bull. Coff. Bd Kenya, 1950, **15**: 324-5.

Reports that a number of estates in Kenya and Tanganyika had produced out-turns in the last two years in which the liquor had an onion-like flavour led to the experiments, on both a laboratory and factory scale, reported here. The results indicate that two factors appear to be necessary for the production of the flavour: first, a certain type of coffee, and, secondly, certain conditions during fermentation, the latter being the less important. The onion flavour did not, however, occur sufficiently often in experimental samples to determine these factors clearly. It would appear that fermentation in prolonged contact with water and perhaps frequent washing may encourage its production, and it is suggested that if the flavour

does appear, washing during fermentation should be discontinued.

Fibres.

(*See also* 3412.)

3233. F.A.O.
Hard fibers.
Commodity Rep. F.A.O. Fibers **2**, 1950, pp. 16, 25 cents.
A summary of the world situation at the end of 1949 is given as regards the three major hard fibres, sisal, henequen and abacá. Tables are given showing production by countries, acreages, world imports and price indices for 1934-38 and for 1948 and 1949. In 1949, world production declined for the first time since the war despite a small increase in the output of sisal, which now accounts for 59% of the total. Henequen declined, but is still above the 1934-38 average. The main decline has been in abacá which now supplies only 17% of the total compared with 33% in 1934-38. Difficulties in rehabilitating the Philippine industry are largely responsible for this, but there was some indication of an upward trend in the first quarter of 1950.

3234. MONTAGNAC, R.
Sur la culture du kapokier (*Ceiba guineensis* var. *clausa*) à Madagascar. **(The growing of kapok in Madagascar.)**
Rev. int. Bot. appl., 1949, **29**: 607-9.
This note on the growing of kapok at the Marovoay station in Madagascar includes a reference to the variation found in plants raised from seed imported from Togoland, and mentions that, while budding proved unsatisfactory in this dry climate, cleft grafting, using grafts with two eyes, gave excellent results.

3235. COOMBER, H. E., AND KIRBY, R. H.
Manila hemp from Borneo.
Col. Plant Anim. Prod., 1950, **1**: 62-4.
Tests on 4 samples of manila hemp grown in Borneo are described. All samples were of very good quality and comparable with normal supplies of hemp from the Philippines.

3236. REINKING, O. A.
Review of bunchy top disease of abacá.
Plant Dis. Reptr, 1950, **34**: 63-5, bibl. 11.
Bunchy top of abacá or manila hemp [*Musa textilis*] is described under (1) Hosts: abacá and banana the only known hosts. (2) Symptoms: early stages, advanced stages, root symptoms. (3) Cause and method of transmission: it is caused by the virus *Marmor abaca* Holmes which is transmitted by an aphid, *Pentalonia nigronervosa* Coq. (4) Other disease factors that may have a bearing on control.—N.Y. State Agricultural Experiment Station, Geneva.

Mangoes.

(*See also* 3198.)

3237. MUKHERJEE, S. K.
Mango: its allopolyploid nature.
Nature, 1950, **166**: 196-7, bibl. 6.
The three species investigated have a chromosome number of n=20 and 2n=40. The allopolyploid origin of mangoes and allied species is concluded from other cytological observations.—Delhi University.

3238. TORRES, J. P.
Splice grafting of mango.
Philipp. J. Agric., 1949, **14**: 247-55, bibl. 4, illus.
A method of grafting found successful on rootstocks 3-12 months old is described. Stocks should be in active growth at the time. Scions should be selected from first, second or third growth flushes of the season, and leaves cut off about 3 weeks before the scions are removed. Scions are cut 8-10 cm. long and an oblique cut 4-5 cm. long made at the lower end. A matching cut is made on the stock and the two bound together with budding tape. Leaves on the stock below the union are left intact. The scion and union are finally covered with a piece of fresh banana leaf from which the scion projects about 3 cm. This cover should be renewed after 8-12 days, and removed after 3 weeks or more. The grafting tape is cut loose after about 2 months. It is also stated that splice grafting has been used successfully in topworking mango, serali, tiessa, citrus and chico.

3239. CHAUDHARY, M. T.
Carotenoid pigments of different varieties of mangoes; changes during ripening.
J. Sci. Fd Agric., 1950, **1**: 173-6, bibl. 32.
Alumina, activated as described, can be used in the chromatographic analysis of the carotenoids of the mango fruit; it effects the separation of four distinct pigments in the fruit. Data for the varieties of fruit are recorded. As mangoes ripen the total carotenoid content and that of the individual pigments rise rapidly to a maximum and then fall later. At temperatures above normal (36° C., 40° C.) these changes are accelerated, but the maximum values are substantially unchanged. Exposure of fruit to ultra-violet light appears to increase the total carotenoid content (including the maximum value) throughout the ripening period. [From author's abstract.]—Punjab Univ., Lahore, Pakistan.

3240. DAS GUPTA, S. N., AND OTHERS.
Necrosis of the mango fruit.
Curr. Sci., 1950, **19**: 153, bibl. 5.
Necrosis in mango fruits was induced by injecting sterile juice from healthy mango fruits over which brick kiln fumes had been passed for some time. Similar results were obtained with ether and chloroform used as solvents for the brick kiln fumes. When ether-soluble constituents of the fumes were separated into three fractions, only the first of these injected independently produced necrosis. It was also found that injections made in parts of the fruit other than the tip did not produce necrosis but the seed was killed as in advanced cases of natural necrosis.

Oil palms.

(*See also* 3199.)

3241. GRINDROD, J.
The palm oil industry of Indonesia.
World Crops, 1950, **2**: 245-8, illus.
A general account is given of the industry which before the war accounted for 24% of the world production

of palm oil, from an average annual yield of nearly 3,000 lb. per acre. Production is now gradually recovering from the war and it is hoped shortly to restore the pre-war level of exports, the target for 1952/53 being 250,000 metric tons gross weight of palm oil.

3242. LAUDELOUT, H.
Étude pédologique d'un essais de fumure minérale de l'" *Élaeis* " à Yangambi. (A soil study on the effects of a mineral fertilizer applied to oil palms at Yangambi.)
Publ. Inst. nat. Ét. agron. Congo belge, Sér. sci., **47**, 1950, pp. 21, bibl. 21.

This paper is concerned with the effects on a soil at Yangambi of applications of fertilizers in which Ca and P were the major constituents. It is not concerned with the responses of the oil palms, although it is noted that two years after the initial application root development had doubled in treated plots between the rows of trees as compared with untreated areas.

3243. BACHY, A.
Observations préliminaires sur la cercosporiose dite " rouille " des feuilles du palmier à huile, due à *Cercospora elaeidis* Stey. **(Preliminary observations on the leaf spot disease of oil palms caused by *Cercospora elaeidis*.)**
Oléagineux, 1950, **5**: 497-9, bibl. 3.

Leaf spot of oil palms became sufficiently serious at the I.R.H.O. station, Sibiti, French Congo, in 1948, to merit investigation. The disease, which is described, invades the young leaves; it has been found equally in nursery seedlings and established plantations, and in areas planted after burning and left unburnt. The long dry season of 4 months offers no check, owing to the incidence of heavy dews. Two applications of 1% bordeaux mixture have been found effective in the nursery, and experiments are now to be carried out on plantation trees.

3244. WARDLAW, C. W.
Vascular wilt disease of the oil palm caused by *Fusarium oxysporum* Schl.
Trop. Agriculture Trin., 1950, **27**: 42-7, bibl. 7, illus.

An account is given with illustrations of the occurrence, distribution and symptoms of a vascular wilt disease of the oil palm, *Elaeis guineensis*, in West and Central Africa, caused by *F. oxysporum* Schl. The disease has been found in nursery seedlings as well as plantation trees. The strain of *F. oxysporum* responsible is distinct from that causing the " Patch Yellow " leaf disease, but, insofar as distinct variations in resistance among varieties of oil palm have been shown to the latter, it may be supposed, as a working hypothesis, that varieties both resistant and susceptible to the new strain are present in the palm population.

Pineapples.

3245. BRAY, D.
Queensland's first pineapples were grown as curiosities.
Fruit World, Melbourne, 1950, **51**: 5: 17, reprinted from *Courier-Mail, Brisbane*, 29.3.50.

An outline of the rise of Queensland's pineapple industry from humble beginnings in 1838 to the record production of 1,800,000 cases in 1949, which may be surpassed in 1950. Varieties of the smooth leaf type, first introduced from Kew in 1881, have now completely replaced the original rough leaf variety for canning. The industry is centred in the south-east corner of the state, whence the crops are shipped either to the wholesale markets at Roma-street or to one of Brisbane's canneries.

3246. MITCHELL, P.
Fertilizing pineapple plants.
Qd agric. J., 1950, **70**: 86-8.

Current recommendations are outlined. The standard fertilizer mixture used is 10-6-10 and applications should be made as close to the plants as possible, preferably into the lower base leaves. When suckers are planted in late September (spring) a dressing of 50 lb. 10-6-10 per 1,000 plants should be applied a fortnight later, followed by 30 lb. sulphate of ammonia in midsummer, by another 50 lb. 10-6-10 in March-April and 30 lb. sulphate of ammonia in May. Where " crookneck " appears this disorder can be controlled by using the 10-6-10 mixture to which copper sulphate and zinc sulphate have been added at rates of 56 lb. each per ton.

3247. RAMÍREZ SILVA, F. J.
The effect of certain micronutrient elements on the growth and yield of pineapple plants.
J. Agric. Univ. Puerto Rico, 1946, **30**: 197-250, bibl. 88, illus. [received 1950].

An abstract of this paper was received earlier and is mentioned in *H.A.*, 18: 2241. Pineapples in Puerto Rico propagated from home-grown slips tend to show " degeneration ", and hence slips are commonly imported from Cuba. As no disease has been found, it seems probable that a nutritional disturbance leading to low reserves of certain elements may be responsible. Pineapple chlorosis, remedied by spraying with iron sulphate, is also commonplace. In the experiments described here, slips of Smooth Cayenne were grown in solution cultures under glass. All plants received the same macronutrients, N, P, K, Ca, Mg and S. Fourteen different treatments involving Fe, Mn, B, Zn, Cu and Al were applied. Among the conclusions reached are the following: Fe counteracted the chlorosis-producing actions of Mn, Cu, and B; increases in Fe in the range 1 to 10 p.p.m. increased green colouring, yield and sugar content and decreased acid content; Fe prevented browning of root tips or root rot in plants under both aerobic and anaerobic conditions, and tended to promote early flowering and early fruit maturity. Mn at 2 p.p.m. induced chlorosis in the absence of Fe, promoted root growth, did not effect yield, but reduced sugar content and increased acidity. B induced chlorosis in the absence of Fe, promoted root growth, tended to retard flowering and fruiting, but increased sugar content and reduced acidity. Zn had a beneficial effect on chlorosis, a somewhat detrimental effect on roots under anaerobic conditions, retarded flowering and fruiting and tended to reduce yields and produce fruit with low sugar and high acidity; Zn-deficient plants showed no anatomical abnormalities. Cu at 2 p.p.m. produced chlorosis in the absence of Fe, prevented root rot under anaerobic

conditions, retarded flowering and fruiting and tended to reduce yields and sugar contents and to increase acidity. Al had a beneficial effect on chlorosis and on root health and growth under aerobic conditions, though highly toxic under anaerobic conditions, did not affect times of flowering and fruiting but tended to reduce sugar contents and increase acidity. In general, chlorosis caused lower sugar contents and higher acid : sugar ratios in the fruit. It is concluded that field experiments should be made to study the effect of adding iron humate to pineapple soils. An extensive review of the literature on the nutrition of pineapple plants is included.

3248. SIDERIS, C. P.
Manganese interference in the absorption and translocation of radioactive iron (Fe^{59}) in *Ananas comosus* (L.) Merr.
Plant Physiol., 1950, **25**: 307-21, bibl. 28.

The following results were obtained from experiments on the absorption and translocation of radioactive iron in pineapple plants grown in nutrient solutions containing 20γ or 4γ Fe^{59}, and either 100γ Mn or no Mn. Most of the iron removed from the solution was deposited in the roots, especially in the cultures supplied with Mn. The amount of iron translocated from the roots to the leaves was considerably lower in the cultures supplied with Mn than in those without. No precipitation of iron, due to oxidation by manganese, could be detected with certainty in the nutrient solutions. Considerable amounts of the translocated iron remained in the proteinaceous matter of the cells, in the cell walls and in substances with peroxidase activity. The data suggest that iron may occur in combination with some proteinaceous fraction, presumably an enzyme, which activates the formation of certain other proteins intimately related to chlorophyll.—Pineapple Res. Inst., Univ. Hawaii.

3249. GROSZMANN, H. M.
Hormones and flowering in pineapples.
Qd agric. J., 1950, **70**: 88-9.

In trials started in Queensland in 1947 [not given in detail here] 5 p.p.m. α-naphthaleneacetic acid applied at 2 fluid ounces per plant in spring and early summer induced flowering as well as did the acetylene treatment and increased fruit weight by 7-14%. Application in the autumn using up to 10 p.p.m. was less reliable. Application several weeks before normal fruit maturity delayed maturity and increased fruit size.

Rubber and other laticiferous plants.

(*See also* 3440.)

3250. LEMARCHAND, S.
Les plantations de caoutchouc au Libéria. **(The rubber plantations of Liberia.)**
Rev. gén. Caoutch., 1950, **27**: 183-6, bibl. 9, illus.

An outline is given of the development of the rubber industry in Liberia by the Firestone Company.

3251. ANON.
L'hévéa à Madagascar. **(Hevea in Madagascar.)**
Rev. gén. Caoutch., 1950, **27**: 6-7.

A few plots of mature rubber trees are to be found in northern Madagascar, where it would appear that soil, climatic and labour conditions are entirely suitable.

3252. SEIBERT, R.-J.
L'origine de l'Hévéa du Rio Negro et l'utilisation des graines dans l'alimentation des Indiens. **(The origin of hevea in the Rio Negro valley and the use of its seed as food by the Indians.)**
Rev. int. Bot. appl., 1949, **29**: 619-21, bibl. 9, abstracted from *Ann. Mo. bot. Gdn*, 1948, **35**: 2: 117-21.

Hevea pauciflora would appear to be the dominant species in the many hybrids and varieties found in the Rio Negro and Amazon valleys. Its yield of rubber is very poor, but its spread as a semi-domesticated tree has been encouraged by the Indians who eat its seeds. Its potential value lies in its resistance to diseases, notably leaf blight caused by *Dothidella ulei*.

3253. SEIBERT, R. J.
Searching the jungles to improve rubbertrees.
Foreign Agric., 1950, **14**: 153-5.

A short note on the search that is being made in Brazil, Colombia and Peru to examine native stands of *Hevea brasiliensis* for strains resistant to leaf blight (*Dothidella ulei*) and other diseases and producing high yields of rubber.

3254. CHITTENDEN, R. J.
The Prang Besar (Malaya) experiments in the selection and propagation of hevea.
Emp. J. exp. Agric., 1950, **18**: 105-11.

The selection and propagation studies on Prang Besar Estate, initiated by Major H. Gough during 1921-24, are reviewed. Following the development of vegetative propagation by budding, 618 clones were established of which 16 were ultimately selected for trials of budded trees and for production of hand-pollinated seedlings. Isolated seed gardens were established using first the best of the original clones and later selections resulting from breeding work. Isolation garden seed has in many cases given yields in excess of some of the primary proved clones. The satisfactory performance of some of the older clones and of seedlings from the isolation gardens has now been established under various conditions throughout Malaya. Among other aspects discussed in the survey are the desirable characters to be looked for in selections, the effect of top-working, the selection of rootstocks on a basis of vigour rather than of yield, nursery tests for seedlings and early field-test tapping, and quality tests on rubber.

3255. SMITH, H. F.
Effect of fertilizers on growth of hevea. A study in combination of data from a heterogeneous group of experiments.
J. Rubb. Res. Inst. Malaya, 1950, **12**: 128-66, bibl. 5, being *Commun.* **266.**

Results are analysed for 23 experiments in which NPK and Ca were applied during the first 2½ to 4 years from planting. Increases in girth were determined at 6 to 8 years. The main response was to phosphate, an increase of 1·69 in. on inland soils and of 0·18 in. on alluvial soils. The greatest response on inland soils came from small applications, the average response to 3 oz. P_2O_5 per tree throughout the period being 1·11 in. compared with a maximum of 1·85 in. for

8 to 9 oz. P_2O_5. With N at 6 oz. per tree throughout the period there was no response on alluvial soil and an average increase in girth of 0·26 in. on inland soil. With K_2O at 2 to 11 oz. there was an average decrease of 0·44 in. on alluvial soils, but no response on inland soils except for a decrease of 0·42 in. when combined with N in the presence of P_2O_5. No variation of response to N or to K could be shown at different places on the same soil type, except for a single exceptionally large response to N on one inland new planting area which showed a marked interaction between N and burning. Responses appeared to be equal on both replantings and new plantings. No response to lime was detected, either with or without P, though there was an indication of a slightly harmful effect in the first year which did not persist.

3256. Akhurst, C. G., and Owen, G.
Manuring experiments on young rubber trees. 1. Effect of fertilisers on growth.
J. Rubb. Res. Inst. Malaya, 1950, **12**: 167-202, being *Commun.* 267.

The results of the 23 manurial experiments referred to in abstract 3255 above are further considered here from an agricultural and practical point of view. The experiments are divided into five groups on a basis of similarity of layout and treatments, the first four groups consisting of trials on newly planted areas cleared of jungle and in one case of lalang, and the fifth group of experiments on replanted areas. Each group is considered separately and the practical application of the results to recommendations on the manuring of young rubber areas is discussed. The most important fact demonstrated is the marked and consistent effect of P_2O_5 in advancing the maturity of young rubber planted in both virgin and previously cultivated inland soils. There have been slight but positive benefits from N in most inland soils, but none from K, though it is pointed out that very sandy soils usually deficient in K were not included in the experiments. Interaction effects between fertilizers or between fertilizers and clones have not been demonstrated. Yield data are now being collected, but pending their analysis it is held that girth measurements represent the best means of determining fertilizer responses. Height measurements taken in the early stages showed similar trends to girth measurements, but tended to exaggerate responses.

3257. Rubber Research Institute of Malaya.
Replanting fertilizer programme.
Circ. Rubb. Res. Inst. Malaya **30**, 1950, pp. 3.

A manurial programme is tabulated for average inland soils for the first 4 to 5 years from planting. Brief notes are given on method of application, strip weeding, mulching, and on the measuring of sample plants to determine growth progress of the trees.

3258. Rubber Research Institute of Malaya.
Note on backward replantings.
Circ. Rubb. Res. Inst. Malaya **31**, 1950, pp. 4.

Backward growth observed in a number of post-war replantings is described. Remedial measures suggested include care in the selection of planting material, the surrounding of young rubber plants with a mulch at least 3 in. thick, the establishment of legume covers combined with strip weeding and the use of rock phosphate in the planting hole and, where this was omitted, the surface application of superphosphate. A tendency towards intervenal yellowing can be corrected by magnesium compounds incorporated in normal fertilizer dressings.

3259. Vermaat, J. G., and van der Bie, G. J.
On the occurrence of copper in tropical soils.
Plant and Soil, 1950, **2**: 257-82, bibl. 10, being *Ser. I.N.I.R.O.** **66.**

The copper content of Indonesian hevea latex was sometimes found to exceed its critical value (=0·001% with reference to the rubber phase) and thereby to impair the stability of the rubber. An extensive survey of soils (data presented) shows that the presence of organic matter reduces the amount of available copper. This observation suggests that in the brown and red lixivia soils, on which most of the Indonesian rubber is grown, excessive copper could be fixed by introducing organic matter by mulching.

3260. Venkataramani, K. S.
A note on a leaf disease of rubber in South India.
Plant. Chron., 1949, **44**: 581, bibl. 2.

An epidemic attack of a leaf disease caused by *Helminthosporium heveae* developed on rubber in parts of S. India in 1948 following prolonged drought, and is briefly described. Observations on clonal varieties showed none escaping infection. In severely affected seedlings " takes " in budding were very poor. Control measures suggested for nurseries are dusting with sulphur or spraying with 5-5-50 bordeaux or Perenox at 4 oz. to 10 gal.—U.P.A.S.I. Tea Exp. Stat., S. India.

3261. Carpenter, J. B., and Langford, M. H.
Target leaf spot of Hevea rubber in Costa Rica.
Plant Dis. Reptr, 1950, **34**: 56, bibl. 4.

The target leaf spot of *Hevea brasiliensis* caused by *Pellicularia filamentosa*, previously reported from Brazil and Peru as a serious disease in nurseries and young plantings, has appeared in the nurseries of the U.S. Department of Agriculture Co-operative Rubber Plant Field Station at Turrialba, Costa Rica. The infections on rubber are believed to have passed to it from some of the numerous hosts of this fungus.

3262. Davidson, L. R., and Rouse, bin H. M. A.
Centralised processing of smallholders' latex and rubber. Experiment 1. Kampong Batu Hampar, Kedah.
J. Rubb. Res. Inst. Malaya, 1950, **12**: 203-11, illus., being *Commun.* **268.**

A satisfactory organization has been established at Kampong Batu Hampar, Merbok, Kedah, for the processing of smallholders' latex from an area of about 500 acres. The simple equipment necessary for such a project is described and the costs incurred tabulated. Production of first quality rubber from smallholders' latex by centralization of processing has been demonstrated as a practicable development. Smallholders have been enabled to maintain their income from their rubber areas and have increased time for other gainful occupation or leisure. A

* Indonesian Rubber Research Institute, Buitenzorg.

reasonable profit can be obtained by the operator provided that he turns out Grade 1 rubber. [From authors' summary.]

3263. DAVIDSON, L. R.
Mud and wattle smoke-houses for rubber as used in Ceylon.
Malay. agric. J., 1950, **33**: 89-92, illus.
The type of mud and wattle smoke-house used by smallholders in Ceylon is described with the aid of plans. The author considers that there are many points which should favour the building of similar houses by the owners of small rubber holdings in Malaya.

3264. MANN, C. E. T., AND OTHERS.
Proceedings of the meeting to discuss the quality and grading of natural rubber.
J. Rubb. Res. Inst. Malaya, 1950, **12**: 212-77, being *Commun.* **269.**
This number of the journal is devoted to a record of the discussions at an international meeting held at Kuala Lumpur in September 1949, together with abstracts of technical reports tabled at the meeting. Following a general review of natural rubber production by C. E. T. Mann and a preliminary exchange of views, the sessions are reported with summaries of the conclusions reached. Abstracts are given of the following technical contributions:

FLETCHER, W. P.
Some problems involved in grading and testing natural rubber.

BLOW, C. M.
Provisional proposals for methods of testing to be adopted to grade crude rubber to technical specifications.

VAN DALFSEN, J. W.
The relations between the modulus and other mechanical properties of rubber vulcanized in the captax test mixture.

VAN ESSEN, W. J.
Rapid determination of the content of dirt in rubber.

DE NEEF, J. C.
Identification of rubber coagulated with too much sulphuric acid.

BAKER, H. C., AND PHILPOTT, M. W.
Coagulation with sulphuric acid.

Two further papers are presented as appendices:

DAVIDSON, L. R.
Report on the development of centralized manufacture of smoke sheet rubber by smallholders.

ANON.
Specified rubbers [an abridged translation of the paper from Indo-China abstracted in *H.A.*, 20: 2040].

3265. KOPACZEWSKI, W.
Étude physico-chimique du latex: *Euphorbia dendroïdes*. **(A physico-chemical study of the latex of *E. dendroides*.)**
Rev. gén. Caoutch., 1950, **27**: 215-16, bibl. 4, illus.
From this study it is concluded that the latex of *E. dendroides*, which is toxic, contains 30·7% dry matter, and of this only 2·8% is rubber, the remainder being composed of resins. As regards colloidal properties the latex is relatively stable.

Sugar cane.

(*See also* 2280, 2704, 2705, 3200, 3423, 3425, 3442.)

3266. BARNES, A. C.
Sugar—Mainstay of the British West Indies. Parts I and II.
World Crops, 1950, **2**: 325-7 and 365-9, illus.
In the first article the history of the industry during the past 50 years is described, and in the second a general account is given of production conditions in each of the colonies concerned.

3267. GRINDROD, J.
Indonesia struggles to restore its sugar industry.
World Crops, 1949, **1**: 173-5, illus.
The very severe damage suffered by the sugar industry in Java during the war and subsequent internal strife is described with the aid of tabulated production figures. It is hoped to restore the pre-war export surplus over the next 4 or 5 years, and energetic steps are also being taken to rehabilitate scientific work at Pasoeroan station which was largely destroyed.

3268. LEUBUSCHER, C.
The processing of sugar cane and of cane sugar.
Col. Plant Anim. Prod., 1950, **1**: 3-32, bibl. in text.
The development and present distribution, organization and production of the sugar cane industries of the world are discussed, and the prospects for sugar-refining and related manufacturing industries in the cane-growing countries considered. Attention may be drawn to the extensive and partially annotated bibliography in the form of footnotes.

3269. LLOYD, A. A.
A survey of sugar cane production conditions and methods in the South African sugar industry.
S. Afr. Sugar J., 1949, **33**: 81-9.
This report by the Secretary of the Mechanization Committee gives details of production, acreages, slopes, and harvesting and transport systems. The equipment used on 385 farms, tractors, mechanical planters, cultivators and loading appliances, is indicated, and the conclusion is drawn that mechanization has so far made very little progress, except with regard to a mechanical planter manufactured locally, which is now used on 72 farms, including many with steep hillsides.

3270. MANGELSDORF, A. J.
Sugar-cane—as seen from Hawaii.
Econ. Bot., 1950, **4**: 150-76, bibl. 40, illus.
The extent of sugar cane production in Hawaii and methods of breeding, propagation, irrigation, harvesting, transport, and pest and disease control are described. Processing is dealt with briefly. Figures of world sugar production and consumption are supplied.

3271. SHERRARD, C. D.
Sugarcane agriculture for beginners.
Proc. 23rd annu. Congr. S. Afr. Sugar Tech. Ass., 1949, pp. 120-30, bibl. 2, reprinted in *S. Afr. Sugar J.*, 1949, **33**: 525-41, bibl. 2.
A useful general account is given of sugarcane cultivation under Natal conditions embracing all aspects from

the preparation of the field to harvesting and the treatment of ratoons. Particular emphasis is placed on the value of a 12-month fallow before replanting cane, keeping the land covered with a green manure crop like sunn hemp or velvet beans. The need for suppression of weeds at an early stage by mechanical means is stressed. In discussing the burning *versus* trashing controversy, experimental evidence is tabulated which shows that burnt fields gave progressively and significantly lower yields in ratoon crops than did trashed fields, and also that the latter responded more fully to fertilizer applications. A manurial programme for plants and ratoons is suggested, and further experimental evidence is given showing the absence of response by ratoons to phosphate on hillsides but the value of leaving a trash blanket as opposed to lining trash during periods of deficient rainfall. Finally, the characteristics of the principal varieties, including several of the new N: Co. types, are described.—Exp. Stat., Mount Edgecombe.

3272. KNOWLES, W. H. C.
The variety and fertilizer position of the sugar industry. XV.
Sugar Bull. Brit. Guiana Dep. Agric. **18**, 1950, pp. 41-51.

A summary, largely tabular, is given of the acreages under different cane varieties for the 1950 harvest in British Guiana, the cycle age of the crops, commercial yields, and the value and quantity of fertilizers used for the 3 years 1947-1949.

3273. MCMARTIN, A.
Present developments in the search for new sugarcane varieties for Natal.
S. Afr. Sugar J., 1949, **33**: 35-41.

The variety Uba has now been almost entirely replaced by introduced varieties, of which the most important are the Indian canes Co's 281, 301, 331 and most recently N: Co. 310, and on alluvial flats the Java varieties P.O.J. 2725 and 2878. These varieties are discussed in general terms in relation to their environment and characteristics of growth, tillering and susceptibility to disease. The need for additional varieties to meet the specialized requirements of different localities is stressed. New varieties may be provided by introducing varieties or seed from abroad or by the breeding of new varieties locally. At present many seedlings from seed produced in Mauritius, India, Hawaii and Queensland are under trial, but none has yet been considered good enough for release. Their use as possible parent canes will depend on discovering methods of inducing flowering in types that usually fail to flower; the problem of obtaining fertile pollen has been largely overcome by subjecting arrows to artificially produced summer conditions. The basis on which hybridization should be carried out is discussed briefly with emphasis on the need for maintaining an adequate proportion of blood of mosaic-resistant " wild " species.

3274. BRETT, P. G. C.
Further report on sugarcane breeding in South Africa.
Proc. 23rd annu. Congr. S. Afr. Sugar Tech. Ass., 1949, pp. 108-14, bibl. 3.
Sugarcane breeding in South Africa.
S. Afr. Sugar J., 1950, **34**: 77-87, bibl. 3.

An account is given of a large number of experiments. Three methods used in attempts to overcome the difficulty of obtaining sufficient viable pollen are described. Methods used for preserving inflorescences of cut canes and the technique of crossing are similar to those practised in Hawaii. Whereas in 1947 only about 230 seedlings were germinated and 54 planted in the field, in 1948 the numbers were about 7,000 and 3,000 respectively.

3275. BRETT, P. G. C.
Investigations on sugarcane breeding in Natal during 1949.
S. Afr. Sugar J., 1950, **34**: 311-19, bibl. 4.

Cut canes of several varieties that were going to flower were kept under artificial conditions. Increasing day length and humidity had no effect, but raising the temperature resulted in the formation of fertile pollen. Differences in the reaction of different varieties to the artificial conditions are described. In experiments with Co. 290, which under natural conditions in Natal may produce embryonic inflorescences but rarely flowers, it was found that floral development could be completed by keeping cut canes under warm conditions similar to those that promoted pollen fertility. From observations in the field and a trial in which plants were subjected to artificial drought it would appear that severe drought can cause a reversion to vegetative growth after embryonic inflorescences have been formed and that the condition known as " bunch-top " is usually produced in this way. In the breeding programme in 1949, 37,000 seedlings were raised from 29 different crosses, 13,000 being planted in the field. About two-thirds of these came from crosses in which the fertility of male parents had been increased by artificial treatment.

3276. ANON.
Yield and sugar content of variety N: Co. 310. Report on comparisons with other cane varieties.
S. Afr. Sugar J., 1950, **34**: 31-5.

N: Co. 310 out-yielded Co. 281 in 13 tests out of 14, Co. 301 in 8 tests out of 18, Co. 331 in one test out of 3, P.O.J. 2725 in 3 tests out of 3 and P.O.J. 2878 in a single test. The highest yield mentioned for any one trial is 87·45 tons cane per acre. The average percentage sucrose in N: Co. 310 was higher than that of any of the other varieties; hence comparisons based on tons sucrose per acre are slightly more favourable to the new variety. N: Co. 310 flowers freely, but the evidence so far obtained does not suggest any loss of sucrose due to flowering at least during the earlier part of the season. It is concluded that N: Co. 310 is a variety of satisfactory yielding capacity, especially compared with Co. 281, but is not suited to poor soils like Co. 301 nor to high altitudes where Co. 331 does well.—Exp. Stat., Mount Edgecombe.

3277. BUZACOTT, J. H.
Varietal changes in the Cairns district 1933-49.
Proc. 17th Conf. Qd Soc. Sugar Cane Tech., 1950, pp. 7-12.

In the Cairns district, producing approximately 750,000 tons cane a year, Badila, the predominant variety for many years, has now declined to 30%, its

place being taken by Cato and Q.44 and in the last two years by Trojan. Two new varieties, Pindar and Q.50, were approved for planting in 1949. The main characteristics of these and other cane varieties grown in the district are described.—Bureau of Sugar Exp. Stats., Gordonvale.

3278. KNOWLES, W. H. C., AND CAMERON, C.
Field experiments with sugar cane. XVIII.
Sugar Bull. Brit. Guiana Dep. Agric. **18,** 1950, pp. 1-37.

Variety trials: Yields of cane and sucrose are tabulated and discussed for 44 trials, and attention is called to the promising performance of D.158/41 over 3 crops and B.41227 over 2 crops. D.142/41 and D.149/41 have proved excellent juice canes and B.41227 has also proved satisfactory in this respect. It now seems certain that B.41227 will prove superior, and B.37161 at least equal, to B.34104, which is the standard commercial cane of the Colony. D.158/41 and B.4098 require further testing, but D.142/41 might now be multiplied to cover about 5% of estate planting programmes. *Manurial trials:* From a series of 13 manurial trials in 1949 no clear or consistent response to P has been evident in plant canes and no residual effect on ratoons. In a single experiment where 6 and 12 cwt. of calcium superphosphate was applied to first ratoons there was a significant yield increase from P, but no difference between the two levels of application. Whereas in Trinidad and other parts of the Caribbean striking yield increases have been obtained from high N, high P manuring, no such response has occurred in British Guiana, nor has any interaction between N and P been observed. For N the standard prescribed dressing is 4 cwt. sulphate of ammonia per acre, but in one trial on ratoons a highly significant response was obtained from 10 cwt. per acre. *Spacing:* In a single trial, now reaped for the third time, closer spacings of 3 ft. and 4·5 ft. continued to show a tendency to outyield 6 ft. spacing, but differences were not significant. *Pre-planting treatment of cuttings with organo-mercurial compounds:* In three trials, treatment with Ateran and in one case Abavit failed to have any measurable effect on yield, even where a marked beneficial effect on germination was observed.

3279. MCMARTIN, A.
The flowering of sugarcane. Flowering in plants in general.
S. Afr. Sugar J., 1949, **33**: 581-3.

Flower bud initiation occurs in response to a 12-hour day in March in Natal and flowers appear in May. Apart from varietal differences an increased amount of flowering generally follows high rainfall in December-February, though this is not entirely consistent and temperature may also be a determining factor. At flowering sucrose contents are still high and the canes are suitable for milling, but some varieties, such as Co. 281, develop side shoots after flowering and in these sucrose becomes low until the side shoots themselves produce millable cane; in other varieties, e.g. Co. 290, flowered canes often die. Flowered cane, particularly the lower portions of the stalk, may be suitable for planting, provided they are not drying out and side shoot development has not proceeded too far.

3280. STOKES, I. E.
Results of date-of-planting sugarcane tests in Mississippi 1939-1946.
Circ. Miss. agric. Exp. Stat. **148,** 1949, pp. 7, bibl. 3.

Results are summarized for 17 experiments carried out over 7 years on 3 soil types. The varieties Co. 290 and C.P. 29/116 were used in all the trials. Autumn plantings were made on 15 October and 15 November, and spring plantings on 15 March and 1 April. In every case autumn planting gave yields of cane and sugar that were equal to, or higher than, those obtained from spring plantings. The effect was particularly pronounced with Co. 290 which gave higher yields when planted in October. Planting date had little effect on the yield of syrup per ton of cane.

3281. MCMARTIN, A.
Sugarcane yields as influenced by crop development.
Proc. 23rd annu. Congr. S. Afr. Sugar Tech. Ass., 1949, pp. 131-7, reprinted in *S. Afr. Sugar J.*, 1949, **33**: 451-61.

A general account is given of data collected over several years from experiments on germination, tiller formation and yields of setts planted in different ways. Among the points discussed are polarity as indicated by the order of development of buds in setts planted upright, upside down, and sideways, the inhibiting effect on germination of shredded cane on the surface or mixed with the soil, the effect of planting position and the use of disinfectants on plant stands and factors influencing tillering. Under local conditions bud development is often so poor that the effect of factors influencing the mode of germination of the sett is small compared with that of those that preserve it in good condition and allow even only one bud to grow per sett. Dense shoot and tiller growth does not always ensure an increased crop owing to increased mortality during the dry months. An even stand, although thin, is better than a stand which is dense in tillering but has gaps.—Exp. Stat., Mount Edgecombe.

3282. VALLANCE, L. G.
The effect of variations in rainfall on C.C.S. in high rainfall areas.
Proc. 17th Conf. Qd Soc. Sugar Cane Tech., 1950, pp. 195-9.

An examination of rainfall figures and C.C.S. values in three areas of Queensland during 1937-1948 showed a significant negative correlation in one area between amounts of rainfall in June-July, the months when crushing starts, and C.C.S. in cane harvested immediately afterwards, and a similar negative correlation in the other two areas between amounts of rainfall in August and C.C.S. The decreases were in the order of 0·05, 0·09 and 0·11 units of C.C.S. per inch of rainfall for the three areas. No connexion was found between January to May or September rainfall and C.C.S., except that in one area, Tully, there were indications that increases in late summer rains (January-February) may increase average seasonal C.C.S. figures.—Bureau of Sugar Exp. Stats., Brisbane.

3283. VAN DILLEWIJN, C.
The intake of water by sugarcane.
Sugar J., 1949, **12**: 4: 3-4, 15-16, bibl. 18.

In a review of the literature on the water relations of

sugar cane, the author discusses: the relatively minute proportions of water absorbed that are retained and used by the plant for development; the capacity for absorbing water through aerial parts and discharging this water into the soil through the roots; the lack of correlation between total root length and absorbing surface and varietal differences in this respect; the influence of external factors on both the extent of root hairs and the rate of water intake; and the forces involved in the uptake of water, namely, root pressure and the suction exerted by leaf transpiration, and the effect of drought in reducing root pressure.

3284. ROUILLARD, G.
Travaux realisés en 1949 par le Centre Agronomique du Nord. (Sugar cane experiments carried out in 1949 at the Centre Agronomique du Nord.)
Rev. agric. Maurice, 1950, **29**: 53-67, plus tables and graphs.

The author, who is Director of the Centre Agronomique du Nord, here presents his annual report for 1949. Thirty-seven field experiments were harvested and 36 others started. Among results obtained from the former and in 1948 are the following: *Nitrogenous fertilizers* (26 trials in 2 years): In areas with rainfalls * of 45 to 75 in., yielding over 30 tons cane per arpent, 40 kg. N per arpent gave higher yields than 30 kg., but 50 kg. proved excessive. In drier areas with about 30 in. of rain, 30 kg. N have given best results. With irrigation, responses have been obtained up to 50 kg. N, but for the present 40 kg. are recommended as a maximum dose for fear of harming the extraction. There has been a definite tendency for ratoon cane to respond better to N than plant cane. It has been found best to apply N in not more than two doses, one when the stools are well developed and the other at the beginning of the summer. As to the form of N, sulphate of ammonia gave slightly higher yields than nitrate of soda in 3 trials out of 4. *Molasses as a fertilizer* (14 trials in 2 years): Whereas 5 and 10 tons of molasses per arpent applied in the presence of nitrogen fertilizer had no beneficial effect and the higher rate actually reduced sucrose markedly, the same doses applied in the absence of N increased yields of both cane and sugar, though reducing the rate of extraction slightly. *Mechanical cultivation and hand ridging* (24 trials in 2 years): Compared with control plots mechanical weeding alone, or combined with ridging, had, if anything, a depressing effect on yields. Responses to ridging were slight and variable. *Organic manure on plant cane* (4 trials in 1949): Despite a dry season 10 tons organic manure per arpent did not improve germination or improve yields as compared with nitrogenous fertilizer alone. *Removal of stones:* On an estate where surface stones had been heaped in every fourth row, inter-row yield records taken over 3 years showed cane rows adjoining the rows of stones averaging 5·5 tons more than intermediate cane rows. In a single experiment in 1949, plots in which stones were lined between every 2 rows of cane averaged 4·7 tons more cane than plots in which stones were lined between every 4 rows. *Alignment of trash* (5 trials in 2 years): No yield difference was found when trash was lined in each inter-row as opposed to alternate inter-rows. *Economic studies:* Results of detailed economic studies on plant and ratoon canes are tabulated and shown graphically. They suggest that, whereas under the traditional system of management net profits tend to decline after the 5th ratoon, with new methods, and particularly the proper use of nitrogen, this decline may not occur until after the 7th ratoon. Growers are urged to work out similar costings for their own estates and to base ratooning on the results.

* 1 arpent = ·422 ha. or just over an acre.

3285. MAIER, E. A.
Present fertilizer practices in Louisiana [on sugar cane].
Sugar J., 1950, **12**: 9: 17-19, bibl. 2.

Satisfactory results have been obtained from the use of aqueous ammonia and anhydrous ammonia gas as nitrogenous fertilizers for sugar cane in Louisiana when the supply of dry forms of N became inadequate. The equipment tried and methods of use are described briefly.

3286. DEMENT, J. D., AND STURGIS, M. B.
Anhydrous ammonia and other materials as a source of nitrogen for sugarcane.
Sugar J., 1950, **12**: 11: 16-17.

Two experiments made in 1949 are reported in which 60 lb. N in 6 different forms gave significant yield increases of 5·6 to 8·9 tons cane per acre in one case and 7·1 to 8·5 tons in the other. In the first case uramon and $(NH_4)_2SO_4$ gave significantly higher yields of both cane and sugar than did CaNCN, but no significant improvement over anhydrous ammonia, NH_4NO_3 or $NaNO_3$, and there was no response to P and K added to the N fertilizers as compared with NH_4NO_3 alone. In the second, differences between N fertilizers were insignificant, but P and K added to each of the N fertilizers gave significant increases.—Louisiana agric. Exp. Stat.

3287. WHALLEY, T. G., AND CLARKSON, F. E. M.
The Clements crop log system.
Proc. 17th Conf. Qd Soc. Sugar Cane Tech., 1950, pp. 201-8, bibl. 1.

The crop log system devised by Dr. H. F. Clements in Hawaii is described. The system, which is based on the sampling of leaf blades and sheaths, aims at providing a means of detecting the lack of water or nutrients during various stages of growth so that these may be corrected with the minimum of delay. Applied to two ratoon fields at Kalamia, Queensland, the results obtained were in fairly close agreement with those in Hawaii. For N, P and K requirements, the crop logs conformed with the results of field experiments. The other indexes (Ca, Mg, moisture, etc.) are likely to prove valuable with better understanding. The authors advocate the keeping of a crop log of each treatment in fertilizer trials, but emphasize that the system calls for an adequate water supply to the crop.

3288. ANON.
The attaining and maintenance of soil fertility in the Tully area.
Proc. 17th Conf. Qd Soc. Sugar Cane Tech., 1950, pp. 243-9.

A survey system is described, whereby the chemical staff of the Tully mill working in conjunction with the

Bureau of Sugar Experiment Stations has undertaken the sampling of soil from each plant cane block in the Tully area. Results of analyses are made available to growers in time to guide fertilizer programmes on the first ratoons.

3289. Luckett, E. J. R.
The value of velvet beans in the Isis district.
Proc. 17th Conf. Qd Soc. Sugar Cane Tech., 1950, pp. 251-3, illus.
The use is advocated of the velvet bean varieties, Somerset and Black, to cover-crop land in the Isis district in the long fallow of about 8 months between cane crops. Suggestions are made for planting the beans, and a locally designed thresher for obtaining seed is described and illustrated.—Isis Cane Pest and Disease Control Board, Childers.

3290. Pearce, O. W. M.
Nitrogen and drainage [in cane fields].
S. Afr. Sugar J., 1950, **34**: 387-93, bibl. 1, reprinted from *Proc. S. Afr. Sugar Tech. Ass.*, 1950.
Following a general account of natural sources of nitrogen in the soil and the effects on these of environmental conditions such as pH and soil moisture, the author discusses the functions of drainage and compares the advantages and disadvantages of shallow open drains with deep, covered French drains consisting of brushwood, stones or bamboo overlaid with cane trash. A case is mentioned of waterlogged land in which the replacement of open shallow drains by French drains resulted in increasing plant-cane yields from 10-15 tons to 35-50 tons per acre.

3291. Borden, R. J.
A survey of plantation fertilizer practices.
Hawaii. Plant. Rec., 1950, **53**: 193-8.
Fertilizer programmes used on 183 cane fields in Hawaii in 1949 are examined; 91 were from unirrigated and 92 from irrigated areas. Average amounts used were N 189 lb., P_2O_5 124 lb. and K_2O 204 lb. Methods of application, numbers and timing of applications, and placement are discussed. Among aspects open to criticism were: Cases in which N exceeded 200 lb. per acre, whereas field tests have rarely shown gains in sugar from more than 175 to 200 lb., even with cane yields exceeding 100 tons; an excessive number of applications; making surface rather than sub-surface applications of phosphate; and failing to differentiate between one field and another.

3292. Bates, G.
Ratooning in the Cairns district.
Proc. 17th Conf. Qd Soc. Sugar Cane Tech., 1950, pp. 255-7, bibl. 2.
Cultivation practices and the use of legumes and fertilizers on ratoon cane in the Cairns district of Queensland are discussed briefly and various suggestions are made based on observations of these practices. —Bureau of Sugar Exp. Stats., Gordonvale.

3293. O'Mara, F. D.
Notes on the juice sampling and cane payment systems at Mossman Mill.
Proc. 17th Conf. Qd Soc. Sugar Cane Tech., 1950, pp. 223-30, illus.
A description is given of the automatic cane juice sampling machine in use at Mossman Mill, its application to both spot and continuous sampling is discussed, and an outline is given of the relative percentage cane payment system used.

3294. Dekker, K. D.
The Luff-Schoorl method for determination of reducing sugar in juices, molasses and sugar.
S. Afr. Sugar J., 1950, **34**: 157-71, bibl. 1.
The Luff-Schoorl method of determination of reducing sugars has been universally adapted for the analysis of all boiling house products. The accuracy of the determination of small amounts of reducing sugars, as in refined sugars, has been shown to be very high and comparable with those obtained with the Ofner method. The Luff-Schoorl solution can be used for the Eynon and Lane titration method, the results agreeing with those obtained iodometrically (E.L.L.S. method). A chemical sucrose determination in juices and final molasses was based on the determination of the percentage of reducing sugars by the E.L.L.S. method before and after inversion. [Author's summary.]

3295. Moberly, G. S.
Summary of experiments conducted with a cane sampling machine.
Proc. 23rd annu. Congr. S. Afr. Sugar Tech. Ass., 1949, pp. 53-6, bibl. 1.
Tests were carried out on a machine devised by O. A. Feltham in 1936 for sampling cane. The sample is in the form of shreds removed by means of a circular saw from the cane as it travels up the mill carrier. The results did not give satisfactory comparisons with total sucrose as determined by standard procedure.

3296. Waddell, C. W.
Towards more accurate determinations of fibre in cane.
Proc. 17th Conf. Qd Soc. Sugar Cane Tech., 1950, pp. 209-16, bibl. 4.
A study has been made of the behaviour of the bagasse blanket under mill conditions in the Philippines and Queensland, and it appears that the errors in locating the beginning and end of a consignment of cane at the bagasse elevator are likely to be surprisingly small. The possibilities of weighing the bagasse from individual consignments and of using these weights as a basis for calculating fibre in cane have been investigated. The results suggest that the true fibre and extraneous matter contained in an individual consignment of 7 or more tons of cane may be determined in this way with an error of not more than 5%. [Author's summary.]—Qd Cane Growers' Council, Brisbane.

3297. Yarbrough, M. V.
Washing of sugarcane in preparation for milling.
Sugar J., 1950, **12**: 12: 20-2, 26-7.
Experience at the Youngsville Factory is described. With about 45% of the total cane ground each day being mechanically loaded and burnt and the remainder still cut, cleaned and loaded by hand, the amount of field mud that could be handled in the factory had reached a critical level and the wear of mill rolls was serious. The installation of a cane washing plant has

had an excellent effect, and the author, in discussing the pros and cons of washing, considers that the subject merits careful study by any factory grinding cane of which one-half, or more, is loaded by machine, irrespective of the types of loader used or procedure adopted.

3298. ANON.
Report of the trash investigation committee.
Proc. 23rd annu. Congr. S. Afr. Sugar Tech. Ass., 1949, pp. 48-52, reprinted in *S. Afr. Sugar J.*, 1949, **33**: 333-9.
Results of tests are tabulated indicating the proportion of trash and tops in standing cane, juice sucrose, and fibre yields, etc., as between clean and trashy cane, yield differences due to inclusion of trash and tops, and a large-scale factory test showing difference in milling performance and analyses due to trash. The presence of trash, apart from reducing throughput, appeared slightly to reduce crusher juice purity, though this will require further proof. However, it certainly adversely affects the purity of the mixed juice and hence reduces the factory boiling-house recovery. Under the present system of payment based on the percentage sucrose in crusher juice, the growers supplying clean cane are penalized at the expense of those supplying trashy cane.

3299. FIELDING, W. L.
The mechanisation of agriculture as applied to sugarcane cultivation.
Proc. 23rd annu. Congr. S. Afr. Sugar Tech. Ass., 1949, pp. 63-71, bibl. 16, illus., reprinted in *S. Afr. Sugar J.*, 1949, **33**: 249-63, bibl. 16, illus.
The achievements of South Africa over the last few years in the mechanization of sugar cane cultivation and loading are reviewed, and some of the problems as yet unsolved are indicated.—Exp. Stat., Mount Edgecombe.

3300. ANON.
Thomson's cane tools.
Sugar J., 1950, **12**: 8: 4-8, illus.
The Thomson Machinery Company is the world's largest manufacturer of special sugar cane machinery and has been largely responsible in Louisiana for reducing the average total man hours needed for producing and harvesting 1 ton of cane from 25 to about 6. The complete range of implements, harvesters, loaders, tractors, ploughs, trash cultivators and wagons produced by the Company are described briefly with the aid of photographs.

3301. ANON.
New McCormick International cane tools announced by International Harvester Export Company.
Sugar J., 1949, **12**: 6: 6, 8, illus.
Brief descriptions are given of the functions of three implements for attachment to tractor toolbars, a sub-trash cultivator for working without removal of trash, a barring-off disc unit for either cutting away soil from, or earthing up, stools, and a disc chopper and cultivator for use mainly in plant cane but also for cutting up rotted trash in ratoon fields.

3302. MAIER, E. A.
The Barras drain cleaner.
CAFFERY, C.
The Barras quarter drain plow.
Sugar J., 1949, **12**: 7: 3-5, illus., and 1950, **12**: 9: 23.
The Barras drain cleaner and its use for sugar cane are described with the aid of photographs. It is a light unit drawn by one mule in which a centrifugal impeller driven by a 10 h.p. [U.S. rating] air-cooled engine scatters soil from the semi-circular drains to 5 yards on either side without forming a ridge. It is claimed that one drain cleaner will keep pace with 4 to 8 tractors, covering an average of about 100 acres per day.

3303. FIELDING, W. L., AND HALL, R. M.
The correct use of implements on the cane farm, with special reference to a plough and a cane planter.
Proc. 23rd annu. Congr. S. Afr. Sugar Tech. Ass., 1949, pp. 79-83, bibl. 1, illus., reprinted in *S. Afr. Sugar J.*, 1949, **33**: 391-9, bibl. 1, illus.
The implements concerned are the Ransome's "Magic" No. 5 reversible two-furrow disc-plough, the 16-in. mouldboard single-furrow Lindeman reversible plough operated on the hydraulic mechanism of a Ferguson tractor, and the simple Australian "Don" planter with small mouldboards added to prevent excessively deep covering.

3304. ANON.
The cane cultivator "Stubbe".
Sugar J., 1950, **12**: 10: 16, illus.
A general description is given of this hydraulically mounted cultivator, manufactured by the General Farm Equipment Co., San Juan, Puerto Rico.

3305. MACLEAN, A.
A system for the mechanisation of cane harvesting.
Proc. 23rd annu. Congr. S. Afr. Sugar Tech. Ass., 1949, pp. 72-8, illus.
A system is proposed whereby the standing cane is cut into short lengths of 6 to 18 in. which would automatically sever the tops and leaves. These latter would then be separated by a form of winnowing, and the cane discharged into a detachable trailer or lorry and trailer running parallel to the harvester. The capacity of the proposed machine is 350 tons cane per day.

3306. MAIER, E. A.
Thornton model SPDL: a new sugarcane harvester that de-trashes as it cuts.
Sugar J., 1949, **12**: 2: 5-7, illus.
The machine, manufactured by the Thornton Grab & Derricks Works, Inc., of Jeanerette, Louisiana, is described and illustrated. It is a self-propelled, four-wheel-drive unit operated by three men, one of whom loads the cane into the attendant wagon. The machine is designed to cut 200 row feet per minute and the loader handled properly will load 40 tons of cane per hour.

3307. ANON.
Mechanization of the sugar farm. The Van der Watt cane trailer: simple loading frames assist operation.
S. Afr. Sugar J., 1949, **33**: 327, 331, illus.
The construction of loading frames or stakes for use with the new Van der Watt cane trailer is described. The cane is tied and delivered in 3-ton bundles which can readily be re-loaded by a crane.

3308. ABRAHAMSON, B. H.
Mechanical loading of cane in Natal and Zululand.
S. Afr. Sugar J., 1949, **33**: 463-9, 717-21, illus.
The loaders described in the first article with illustrations are the Thomas loader, P. & H. Drag-line cane loader, the Hyster crane mounted on a D.4 Caterpillar tractor, the Van der Watt self-loading trailer with loading frames, and the Castagnos loader. The second article gives a more detailed account of the stack-loading system and in addition to the machines mentioned above describes briefly the B.M.S. loader now under construction, the lorry or tractor mounted with a winch, and the Brooks load lugger.

3309. MAIER, E. A.
Loading sugar cane.
Sugar J., 1950, **12**: 10: 9-10, illus.
A brief history of the loading of sugar cane in Louisiana is followed by short descriptions of the following loaders: The Castagnos, the Naquin, the Babin loader and ditcher, the P & H (DCL) caneloader and the Hurrycane hydraulically controlled loader.

3310. BAMPTON, C. C.
Lubrication and cane trucks.
Proc. 17th Conf. Qd Soc. Sugar Cane Tech., 1950, pp. 43-8, illus.
Investigations suggest that a saving in haulage of about ½d. per ton of cane could be made by modifications in the lubrication of cane tramway trucks. Three alternatives to the present system are described: A metering gun designed to dispense and record the lubricant injected into the axle box, a new type of axle box, and the ball-bearing box which is already giving good service in some cases.

3311. TEJADA, J. DE D.
A new cane shredder: the "Suerto" installed at Adelaide, Camagüey, Cuba.
Int. Sugar J., 1950, **52**: 155-6, illus.
The introduction of the short-blade, single rotor, medium speed, self-feeding cutter-shredder described here resulted in an average increase in extraction from 95·02 to 96·60 and a reduction in sucrose in bagasse from 2·48 to about 1·70.

3312. MARTIN, L. F.
Potential by-products of raw cane sugar manufacture.
Sugar J., 1950, **12**: 11: 12-13, 23, being *Contr. agric. Chem. Res. Div. U.S. Dep. Agric.* **253.**
Considerable industrial development has already occurred based on the use of bagasse fibre and of such constituents of molasses as aconitic acid, and the recovery of sugar cane wax is being undertaken in Cuba. Some of the many other possibilities that remain to be explored are discussed in general terms.

3313. WEBRE, A. L.
Glucose destruction in cane sugar manufacture.
Sugar J., 1950, **12**: 9: 15-16.
The evidence indicates that glucose losses are actually more important than sucrose losses, and suggestions are made for minimizing them.

3314. VENTRE, E. K., AND BALCH, R. T.
Powdered calcium carbonate (oyster shell flour) in processing of sugar cane.
Sugar J., 1949, **12**: 6: 10-11.
Specific recommendations, based on a season's experience, are given on the use of calcium carbonate to speed up the clarification of refractory juices giving high mud volumes. It is claimed that it permits clarifiers and filters to operate at nearly normal rated capacity with stale or trashy cane.

3315. KING, N. J.
Fall in sugarcane yields: "running out" of varieties.
S. Afr. Sugar J., 1949, **33**: 595-7.
The Director, Bureau of Experiment Stations, Queensland, discusses experience in the deterioration of certain varieties in Australia. Evidence suggests that neither decline in the general level of fertility nor deterioration in soil structure are responsible. Three cases are described which suggest that symptomless diseases are the most probable cause. Some 17 years ago it was found in one experiment that Q.813 grown in steam-sterilized soil gave 2½ times the yield of the same cane planted in unsterilized soil. More recently a systemic disease has been found causing stunting in Q.28, which can be spread by inoculation. Finally a grower in Bundaberg overcame declining yields in P.O.J.2878 by using setts from a neighbouring farm in place of his own material.

3316. LIU, H. P.
A comparative study of inducing mosaic infection in sugar cane by various inoculating methods. [Chinese, English summary.]
Rep. Taiwan Sugar Exp. Stat., 1949, **4**: 210-20, from abstr. in *Rev. appl. Mycol.*, 1950, **29**: 383.
In comparing various techniques for the inoculation of sugar cane with mosaic virus the author found that a modification of Matz's method was the most satisfactory. About four drops of extracted viruliferous juice were dropped into the axil of the youngest open leaf, and the tight roll of young leaves was pricked 100 times through the inoculum with a steel needle (0·2 mm. in diameter). The incubation period was 19·8 days and the average infection 95%.

3317. HUGHES, C. G.
Downy mildew disease in north Queensland.
Proc. 17th Conf. Qd Soc. Sugar Cane Tech., 1950, pp. 237-42.
The disease, which has re-appeared in a small outbreak in the Cairns district after a lapse of six or seven years, is described, and cane varieties listed as to their susceptibility to it. Control measures include the roguing of diseased stools where a small focus of infection is

found, and the early harvest and ploughing out of diseased fields followed by a bare fallow. No plants of any variety should be taken from an area within half a mile of a diseased field, nor should susceptible varieties be planted within this area. Quarantine restrictions prevent the movement of cane plants from the Bundaberg district where the disease still occurs.

3318. Patel, M. K., Kamat, M. N., and Padhye, Y. A.
A new record of *Puccinia* on sugarcane in Bombay.
Curr. Sci., 1950, **19**: 121-2, bibl. 1, illus.

It is suggested that a new species of *Puccinia*, which it is proposed should be named *P. sacchari*, was responsible for a serious outbreak of rust on sugar cane in the Deccan Canal tract in 1949. Only the variety Co. 475 was attacked, and it is pointed out that this otherwise very promising variety is also exceptionally susceptible to whip smut caused by *Ustilago scitaminea*.

3319. Chona, B. L., and Munjal, R. L.
***Puccinia kuehnii* (Krueg.) Butler on sugarcane in India.**
Curr. Sci., 1950, **19**: 151-2, bibl. 2, illus.

Severe infection on the leaves of Co. 475 in the Bombay province is attributed to *Puccinia kuehnii*, the spores of which are described [see also abstract 3318 above].

3320. Hirschhorn, E.
Especialización fisiológica del carbón de la caña de azúcar (*U. scitaminea*). **(Physiological specialization of smut (*Ustilago scitaminea*) on sugar cane.)***
From abstr. in *Idia*, 1949, **2**: 24: 8.

With a view to breeding smut-resistant varieties of sugar cane, the possibility of the existence of physiological strains of the fungus was investigated in Tucumán. It was found that many such strains, varying in their pathogenicity, do exist. The strains, moreover, may vary from country to country. In South Africa, for instance, the varieties Co. 209 and P.O.J. 2.778 are very susceptible to smut, while in the Argentine they show a high resistance.

3321. Steib, R. J., and Chilton, S. J. P.
Phytophthora rot of sugar-cane seed pieces.
Abstr. in *Phytopathology*, 1950, **40**: 26.

A rot of sugar cane seed pieces was found in Louisiana from which three types of *Phytophthora*-like cultures were consistently isolated. One of these has been identified as *P. erythroseptica*. The other two have not been identified. The disease was associated with poor drainage and relatively low temperatures. In inoculation experiments symptoms similar to those found in the field were obtained, and it was further demonstrated that high soil moisture was necessary for severe infection of sugar cane stalks. The disease was widespread throughout the State.

3322. Chu, H. T.
Effect of hot water treatment on the control of downy mildew on cane seed pieces. [Chinese, English summary.]
Rep. Taiwan Sugar Exp. Stat., 1948, **3**: 227-31, from abstr. in *Rev. appl. Mycol.*, 1950, **29**: 382-3.

Downy mildew (*Sclerospora sacchari*) is one of the most important sugar cane diseases in Formosa. It was introduced in Australian cuttings about 1909 and recurs annually, some fields having as much as 43·5% infection. After hot water treatment (52° C.) for one hour diseased cuttings gave rise to 94·7 to 100% healthy stools, and when the treatment was preceded by immersion of the cuttings in water at 40° to 46° for one hour almost complete control was obtained.

3323. McMartin, A.
Fungicidal treatment for sugarcane cuttings: summary of recent trials.
S. Afr. Sugar J., 1949, **33**: 651-5.

Five recent trials are described with fungicides for the pre-planting dip of cane setts to control diseases, notably pineapple disease. Among organo-mercurials Aretan, Abavit S, Solanosan, Agrosan GN., R.1412×157 and R.1412×159 gave good results and Leytosan and Hortosan D.P. are considered worthy of further trial. Among non-mercurials, R.1334×14, Phygon and Dowicide H showed more promise than other non-mercurials tested previously. The need for confirming these responses under other soil and temperature conditions is stressed.—Exp. Stat., Mount Edgecombe.

3324. Ingram, J. W., and others.
The sugarcane borer situation in Louisiana: latest Louisiana borer control measures.
Sugar J., 1950, **12**: 12: 12-14, illus.

The sugar cane borer, *Diatraea saccharalis*, is the major pest of sugar cane in Louisiana and other parts of the western hemisphere. A native parasite, *Trichogramma minutum*, provides some control, especially late in the season, but none of 15 introduced parasites has become established. Eleven agronomically promising varieties of cane are listed which have shown some degree of resistance to borer. Since 1937 cryolite dust applied at 8 to 10 lb. per acre, 4 times at weekly intervals in April, has given 85 to 90% control of first generation borers, followed by dusting of localized areas of infestation in June, which controls 50% or more of second generation borers. Since 1945 similar applications of 40% ryania dust, the ground stem and roots of *Ryania speciosa*, have proved equally successful without the risk of increasing the population of the yellow sugar cane aphid, *Sipha flava*, which sometimes follows the use of cryolite. DDT, BHC, chlordan, toxaphene and parathion have not given satisfactory borer control. Cultural measures which assist in control are listed, among which it is recommended to shave off the shoots in late February or early March and plough these under in the middles to destroy overwintering borers, and to pick up any loose cane left behind by the loaders at harvest.—U.S. Dep. Agric. Bur. Ent. Pl. Quar.

3325. Wilson, G.
The effect of soil applications of benzene hexachloride on C.C.S.
Proc. 17th Conf. Qd Sugar Cane Tech., 1950, pp. 13-15.

Cane yields and C.C.S. are tabulated for 10 trials in which 10% BHC dust was applied at rates of 0 to 200 lb. per acre to control grubs. Cane suffering from a very light grub infestation and harvested early may sometimes show a slightly higher C.C.S. than cane treated with BHC, but in general both yield and

* Paper given at the First South American Congress of Agricultural Investigations, La Estanzuela, Uruguay.

C.C.S. are improved by treatment.—Bureau of Sugar Exp. Stats., Gordonvale.

3326. DICK, J.
The effect of benzene hexachloride and DDT dusts on the germination of sugarcane.
Proc. 23rd annu. Congr. S. Afr. Sugar Tech. Ass., 1949, pp. 118-19, bibl. 2.
The germination of sugarcane: the effect of benzene hexachloride and DDT dusts.
S. Afr. Sugar J., 1949, **33**: 599, bibl. 2.
In Natal cane setts are sometimes damaged in the soil by Dynastid beetles of the genera *Temnorrhynchus* and *Heteronychus*. Tests are described with N: Co. 310 and Co. 281 in which dusting with 2·5% DDT or 0·5% gamma BHC had no effect on germination.—Exp. Stat., Mount Edgecombe.

3327. VOLP, P.
The control of cane grubs with benzene hexachloride in the Mulgrave district.
Proc. 17th Conf. Qd Soc. Sugar Cane Tech., 1950, pp. 17-22, illus.
The greyback cane beetle, *Dermolepida albohirtum* Waterh., has in the last two years been controlled on a large scale in the Mulgrave area by dusting with BHC, usually 10% (containing 1·3% γ BHC) and occasionally 20%. In young plant cane 70 to 100 lb. per acre has generally been applied, in narrow bands on either side of the rows, immediately before filling in the furrows by cultivation. There has been a good residual effect, but cases are recorded where repeat applications on first ratoons, generally at 40 to 70 lb. per acre, have given good results. An example is given of the superiority of BHC over carbon bisulphide soil fumigation.—Mulgrave Cane Pest and Disease Control Bd, Gordonvale.

3328. WILSON, G.
Benzene hexachloride distributors.
Proc. 17th Conf. Qd Soc. Sugar Cane Tech., 1950, pp. 23-38, bibl. 3, illus.
The general requirements of distributors for BHC dust are discussed and the following machines described: *Independent machines:* The Mourilyan machine, the Camuglia distributor, a type similar to a lime spreader developed at Babinda, the Sunshine plantation drill, the "Sunfurrow" drill, the Lizzio distributor, and the Vibrator and "Suntapper" distributors. *Attached distributors:* The Don fertilizer distributor, the Massey-Harris distributor, Star fed hoppers, the Pezzutti distributor and the Hodge conical hopper.—Bureau of Sugar Exp. Stats., Gordonvale.

3329. DICK, J.
Some further insecticide tests against the elegant grasshopper.
Proc. 23rd annu. Congr. S. Afr. Sugar Tech. Ass., 1949, pp. 115-17, bibl. 1.
In laboratory tests against the elegant grasshopper, *Zonocerus elegans* Thnb., almost 100% kill was obtained with Bexadust, a powder containing 0·5% of the gamma isomer of BHC, though another dust stated to contain 2% γ-BHC gave inconsistent results. A 2·7% DDT emulsion killed about 88% and a solution of common salt about 40%.—Exp. Stat., Mount Edgecombe.

3330. ANON.
Soil fumigation [for sugar cane].
Sugar J., 1949, **12**: 4: 5-7, illus.
In trials by the U.S. Dep. Agric. in 1947, reductions in soil insects and increases of 5 to 15% in yields of sugar were obtained by the use of 400 lb. per acre of 1% chordan, 0·2% gamma BHC, 1% DDT and 1% toxaphene. In an experiment with soil fumigants 20 gal. DD per acre increased sugar yields by 10-12% compared with a 3·7% increase from 15 gal. 40% ethylene dibromide. Subsequently DD has been used extensively, with generally excellent results, in different parts of the U.S.A. and in Hawaii.

3331. INGRAM, J. W., AND OTHERS.
Chemical control of soil insects and organisms attacking sugarcane.
Sugar J., 1950, **12**: 10: 13-14, 20.
Results are tabulated and discussed for experiments which appear to be those referred to in abstract 3330 above. In addition, soil insects found inhabiting sugar cane fields in Louisiana, Florida and Georgia are listed, and additional trials described. In an experiment to control wireworm in a field in Louisiana planted in October 1947, stands of cane were increased 4½-fold to 2-fold by treatment of setts in the planting furrow with 1% chlordan, 1% toxaphene, 0·2% gamma BHC and 1% DDT in that order; cane and sugar yields were increased significantly by all treatments. In 1948 a trial with heavy dressings of the same chemicals and parathion was found to have no depressing effect on the crop and no residues of the insecticides were found in the juice.—U.S. Dep. Agric. Bur. Ent. Plant Quar.

3332. COOPER, W. E., AND CHILTON, S. J. P.
Studies on antibiotic soil organisms. I. Actinomycetes antibiotic to *Pythium arrhenomanes* in sugar-cane soils of Louisiana.
Phytopathology, 1950, **40**: 544-51, bibl. 9, illus.
This is a study of the antibiotic activity of the different actinomycetes against *Pythium arrhenomanes*, a common root rot fungus of sugar cane in Louisiana. The average inhibitory ability of the actinomycete populations increased as the pH of the soil samples increased up to 7·5, above which there was a slight decrease. The number of actinomycetes in contact with the roots was much greater than in the surrounding soil.—Louisiana State Univ., Baton Rouge.

3333. MCDOUGALL, W. A.
The rat poisons, sodium fluoroacetate and "castrix" [against cane rats].
Qd J. agric. Sci., 1950, **6**: 54-60, bibl. 8.
In tests against *Rattus conatus* Thomas and *Melomys littoralis* Lonnberg, the most important rat pest species in Queensland cane fields, sodium fluoroacetate at 1 : 1,000 proved as effective as the more expensive thallous sulphate used in food baits. "Castrix" also proved effective, but is likely to prove too dangerous to man and domestic animals to warrant its use. Neither of the new poisons proved so effective as yellow phosphorus when used as pastes on bread snap baits.

Tea.

(*See also* 3421, 3429, 3435.)

3334. HARLER, C. R.
Tea planting in Nyasaland: first impressions in field and factory.
Nyasaland agric. quart. J., 1949 (published April 1950), **8**: 65-76, bibl. 4.

In a survey of planting methods in Nyasaland the author compares yields and practices with those obtaining in N.E. and S. India and in Ceylon. The average crop in Nyasaland compares favourably with that in other tea lands, but an unfavourable impression was created by the general absence of leguminous shade trees, the relative smallness of the bushes in many fields and the resultant exposure of clean cultivated soil to the sun. Recommendations are made for the planting of cover crops, the testing of shade trees, the annual application to mature tea of 400 lb. sulphate of ammonia per acre, and for a reconsideration of the question of plucking levels and of plucking. Advances in methods of manufacture are noted briefly.

3335. EDEN, T.
Recent advances in tea research. I. Cultural practices. II. Pathological problems. III. Manufacturing processes.
World Crops, 1949, **1**: 66-9, bibl. 5, illus., 132-5, bibl. 3, illus., and 165-7, bibl. 7.

Among the points brought out in this interesting review are the following: *Cultural practices:* The wide variation in performance of seedling tea is illustrated by tabulated data from a Ceylon survey. Qualities to be considered in selection include ease of rooting, 75 to 80% success being obtained with suitable types, branching habit, disease resistance, and the avoidance of non-fermenting bushes. The importance of controlling soil erosion is stressed. In both India and Ceylon it has been found that cultivation is beneficial only in so far as it suppresses weeds, and figures are given to show the ill effects of both excessive cultivation and excessive weed growth. The results of fertilizer trials are considered, responses to N being most spectacular in both India and Ceylon, especially when applied in the middle of the pruning cycle of 2 to 5 years. Variation in response to hard pruning in Ceylon between tea grown above and below 3,000 ft. has been shown to be associated with carbohydrate reserves in the roots; at lower elevations these are too small to support the rhythm of new growth following hard pruning, and die-back of branches is commonplace. *Pathological problems:* Blister blight is described briefly. Phloem necrosis, occurring mainly above 4,000 ft. in Ceylon, is a virus disease, apparently spread by an unknown organism with limited mobility; the main control is likely to be effected by propagating high jât symptomless carriers. The biological control of tea tortrix, *Homona coffedria*, is discussed, as is the connexion between pruning cycles and the control of shot-hole borer, *Xyleborus fornicatus*. The control of tea yellows in East Africa by applying sulphur is mentioned. *Manufacturing processes:* Studies on the chemistry of tea leaf indicate that good tea is made in the field, and no refinements in manufacture can create quality from inferior leaf. Standard rolling and the new development of epicyclic rolling are discussed as well as witherless tea manufacture and drier design.

3336. DE J[ONG], P.
Policy, aims and objects of the U.P.A.S.I.* tea scientific department.
Plant. Chron., 1950, **45**: 313-15.

An outline of the main research problems is included, namely, possible control of blister blight by fungicides and by altering plucking practice, *Helopeltis* control by insecticides alternative to DDT, control of " defoliation ", and vegetative propagation by cuttings, hitherto not entirely satisfactory in S. India.

3337. VENKATARAMANI, K. S.
An instance of polyembryony in tea.
Plant. Chron., 1950, **45**: 180-1, bibl. 3, illus.

A germinating tea seed is described, which had three embryos, each with a pair of cotyledons, a plumule and a radicle.—U.P.A.S.I. Tea Exp. Stat.

3338. KEHL, F. H.
Vegetative propagation of tea by nodal cuttings.
Tea Quart., 1950, **21**: 3-17, bibl. 6, illus., [reprints being available from the Tea Res. Inst. of Ceylon at 25 cents inclusive of postage].

Yields of individual tea bushes at St. Coombs and Galatura are tabulated to indicate the wide variation in performance in seedling tea, and the method of selecting mother bushes, on a basis of yield, growth characters and resistance to diseases and pests, is described. In taking cuttings, bushes reaching the flowering stage are best avoided as cuttings from them generally make little growth but merely develop flowers. The material is kept moist throughout the period of collection and preparation. Sappy terminal growth and woody basal growth is discarded; both green and red wood cuttings are taken, the former being somewhat the better. Single leaf cuttings have been found to root better than double or treble leaf cuttings, but double leaf cuttings may be used when the internodes are short. Results of trials with Hortomone A, urea and Seradix B are tabulated; responses were negligible. Cuttings should be planted in free-draining, artificially shaded nursery beds, free from eelworm, about 4-6 in. apart. The care and watering of the beds is described. After 4 months liquid manure from cow dung may be applied once a fortnight. When the plants carry 8 to 10 leaves they should be pinched back (centred) to 3-4 leaves, those clones that fail to branch after this treatment being discarded. After 1 year the plants can be transplanted to the field either established in baskets or direct from the beds by means of a Hersall transplanter, preferably with a 5½-in. cylinder, or as stumps. The establishment of test plots, their manuring and recording are described.

3339. DANIEL, F. C.
Notes on contour planting.
Tea Quart., 1950, **21**: 1-3, illus.

The relevant sections are reprinted from an Ordinance promulgated by the Ceylon Government on 10 August, 1949, requiring any land to be opened in tea to be

* United Planters' Association of Southern India.

" planted on the contour or as near the contour as the lie of the land may permit ". The recommended method of procedure of contour planting and drainage is here outlined. As to spacing, the author refers to experience at St. Coombs; one area planted in contour rows 5 ft. apart with plants 1½ ft. apart formed better terraces and provided easier working than did 4 ft. contours with 2 ft. spacing; both areas yielded much better than a comparable area planted up and down hill.

3340. PATERSON, H. C.
Root disturbance with special reference to tea cultivation.
Tea Quart., 1950, **21**: 23-7, illus.

Methods of forking in manure and fertilizer are discussed with reference to the root system of the tea bush. Current practice is to apply manure and fork alternate rows to minimize damage, but if forking is carefully done manure can be applied with advantage in every row. The old, and now largely abandoned, practice of burying prunings in pits in the field resulted in the destruction of nearly 1 lb. fresh roots per bush, and encouraged root disease and soil erosion.

3341. HARLER, C. R.
The importance of humus in Assam tea estates: experience and experiment over a century of planting.
World Crops, 1950, **2**: 280-2, 286, bibl. 1, illus.

Changes in the outlook on manuring over the past 30 years are discussed. Following a period when green manuring was practised in conjunction with artificials, artificials, particularly nitrogen, were used alone. In the 30's the pendulum swung towards composting, and in South India in particular large areas of scrub jungle were devastated to provide adequate quantities of material. Experiments at Tocklai indicated the main benefit of compost to be the nitrogen content and that fresh organic material applied direct to the soil was better than composted material. Trials also indicated a high nitrogen release and enhanced tea yields from mature sau shade trees, *Albizzia stipulata*, planted 50 ft. × 50 ft. triangularly. With no deep cultivation and with annual pruning (in Assam) adding 3 to 10 tons of vegetation to the 10 to 30 tons of leguminous foliage shed by the shade trees, there should be no need to provide compost.

3342. PORTSMOUTH, G. B.
Potash requirements of tea.
Tea Quart., 1950, **21**: 18-22, bibl. 4.

In the last few years there has been increasing evidence that potash deficiency is developing in many up-country tea areas in Ceylon. Symptoms noted are declining yields, premature fall of the older leaves, and marginal leaf scorch. In the St. Coombs manurial experiment no response to K occurred in the first 10 years, but from the fourth pruning cycle onwards K has given increasing responses until at the end of the sixth cycle they were as great as, or greater than, the responses to N. About 3½ to 4 lb. K_2O is probably removed with each 100 lb. of crop, and this ratio can be used to arrive at approximate deficits in relation to past fertilizer applications.

3343. DARASELIYA, N. A.
The development of azotobacter in the rhizosphere of the tea bush. [Russian.]
Počvovedenie (Soil Science), 1950, pp. 35-8, from abstr. in *Soils and Ferts*, 1950, **13**: 1160.

Azotobacter was found in red, acid tea soils near Batum. The bacteria were particularly numerous in organically, and rather less numerous in inorganically, manured soils, and more numerous in the rhizosphere than in the rest of the soil.

3344. DE JONG, P.
Some aspects of frost damage and crop protection.
Plant. Chron., 1950, **45**: 376-8.

A general outline is given of work in other countries on frost damage and crop protection. Few of the measures being tried are likely to be of value in protecting tea, for which the solution would appear to lie in the selection and propagation of frost-hardy bushes, the avoidance of frost pockets, and shade and shelter belt layouts designed to give maximum cold air drainage.

3345. DE JONG, P.
" Defoliation ": a disorder of tea in S. India.
Plant. Chron., 1950, **45**: 155-8, 174-80, bibl. 10, illus.

The disorder known as " defoliation ", distinct from that caused by blister blight, became prevalent in the Wynaad and Nilgiri-Wynaad districts of S. India in 1947. Preliminary investigations produced no evidence that pathogenic organisms or mite attack were causal factors. The possibility that the cause may be physiological, associated either with drought or a nutrient deficiency or an interaction of the two is being investigated. Yields tabulated for three 3-year cycles of an NPK manurial trial show declines in the last cycle in plots receiving no K, some of which can be attributed to defoliation. Defoliation has, however, also occurred on plots receiving K and in fields that have received a high level of manuring, including K. Evidence regarding the effect of drought is also conflicting. The soils of the affected areas are markedly heavier than those of other tea districts, usually have a low natural fertility and are subject to drought. Removal of shade trees to control blister blight has resulted in lower soil moisture contents. The bushes themselves appear to have been inherently weak before the disorder occurred. Possible remedies include liming to improve soil structure, a policy of controlled shade, a combination of clean pruning and resting to rehabilitate the bushes, and the application of balanced fertilizer some 6 months after pruning.

3346. VENKATARAMANI, K. S.
The inhibition of the growth of fungi by certain dyestuffs. 1. Some observations on the effect of malachite green on the growth of *Rhizoctonia solani* and on the germination of the spores of *Pestalozzia theae*.
Plant. Chron., 1950, **45**: 5-10, bibl. 7, illus.

In pure cultures the growth of *Rhizoctonia solani* was checked by 4 p.p.m. malachite green, but it required 10 and 15 p.p.m. of the dye in the agar substratum to inhibit spore germination of *Pestalozzia theae*. It is

noted that preliminary trials with 10 p.p.m. against *Exobasidium vexans* did not give encouraging results.—U.P.A.S.I. Tea Exp. Stat.

3347. Porter, R. H.
Maté: South American or Paraguay tea.
Econ. Bot., 1950, **4**: 37-51, bibl. 23, illus.

Maté, made from the leaves of *Ilex* spp., is the common drink of nearly 20 million people in S. America, and annual production of dry maté is estimated to be 200,000 metric tons. This article outlines the history of the crop, the species of *Ilex* used and their main botanical characteristics, harvesting, curing and processing, production and consumption in the different S. American countries, attempts being made to cultivate the crop in Argentina, chemical analyses of the leaves, and the uses and methods of preparing maté.

Vanilla.

3348. Knudson, L.
Germination of seeds of vanilla.
Amer. J. Bot., 1950, **37**: 241-7, bibl. 7, illus.

The mode of germination of seeds of vanilla is described. Germination of seeds of *Vanilla fragrans* is possible if the cultures are maintained in a dark incubator at 32° C. Seeds of *V. fragrans* × *V. pompona* require a minimum temperature of 34° C. Dormancy in vanilla seeds may be prolonged and under greenhouse conditions may continue for several years. Exposure of seeds to greenhouse conditions before incubation in the dark incubator results in a higher percentage of germination. For the first time hybrid seedlings of vanilla have been produced. [Author's summary.]—Cornell University, Ithaca.

Other crops.

(*See also* 3397.)

3349. Plank, H. K., and Ferrer-Delgado, R.
Permanence of DDT in powder-post beetle control in bamboo.
J. econ. Ent., 1949, **42**: 963-5, bibl. 3.

In Puerto Rico green and partly dried sections of cut bamboo culms were dipped whole for 10 minutes in a 5% solution of DDT in fuel oil and in the solvent alone. The solvent alone gave slight protection against internodal infestation by the bamboo powder-post beetle, *Dinoderus minutus*, lasting only 6 months on partly dried bamboos. The 5% DDT solution gave a 12 months' control on both green and partly dried bamboo, but persisted longer on the green culms. Pieces of bamboo dipped separately in the same solution remained toxic to the beetle for 24 months, and small commercial lots remained free of infestation by all wood-boring insects for 30 months. [See also *H.A.*, 19: 3483.] [From authors' summary.]

3350. Legris, P.
Le benjoin dans la province de Sam Neua.
(Benzoin in the province of Sam Neua.)
Rev. int. Bot. appl., 1949, **29**: 612-15.

Gum-benzoin, used in perfumery, is obtained by tapping the trunks of the tree *Styrax tonkinensis*, the main source of supply being the Sam Neua province of Indo-China. A brief description is given of the tree, its cultivation, and methods of extracting, collecting and disposing of the gum.

3351. Chevalier, A.
Répartition géographique et exploitation des palmiers *Borassus*. **(The geographical distribution and utilization of palms of the genus *Borassus*.)**
Rev. int. Bot. appl., 1949, **29**: 585-92, bibl. in text.

The various classifications that have been applied to the palm genus *Borassus* are discussed. The evidence suggests that the genus originated in Africa, where the numerous forms and varieties varying as to type and yield of nuts and in sugar content of the sap probably belong to a single species, *B. aethiopum*. From Africa the genus has spread, largely through the agency of man, to Madagascar, India and the Far East. The asiatic form *B. flabellifera* has been developed by selection on a basis of its sugar content.

3352. Leira, A. R.
Alcanfor; sus fuentes de producción. **(Camphor; its sources of production.)**
Bol. Prod. Fom. Agric., 1949, **1**: 27-32, from abstr. in *Soils and Ferts*, 1950, **13**: 1172.

The camphor tree, *Cinnamomum camphora*, needs fertile, medium or sandy loam for successful cultivation. An account is given of a trial cultivation of the herbaceous species *Ocimum kilimandscharicum*, a native of East Africa from which camphor and various essential oils were obtained.

3353. Krishnan, P. P., and Guha, P. C.
Mysore cardamom oil.
Curr. Sci., 1950, **19**: 157, bibl. 5.

An investigation of the ingredients of cardamom oil is reported briefly.

3354. Barker, C., Dunn, H. C., and Hilditch, T. P.
African drying oils. V. Some Nigerian and Sudanese drying oils.
J. Soc. chem. Ind. Lond., 1950, **69**: 71-5, bibl. 12.

The fatty oils from the seeds of *Hyptis spicigera* and *Ocimum viride* from Nigeria, and of *O. kilimandscharicum*, *Euphorbia calycina*, *E. erythraeae*, and *Chrozophroa plicata* from the Sudan, have been examined with reference to their component fatty acids and their suitability as drying oils. The oils of *H. spicigera*, *O. kilimandscharicum* and *E. calycina* closely resemble conophor oil in their fatty acids and their high content of linolenic acid; that of *E. erythraeae* is very similar to linseed oil in composition, and *C. plicata* seed oil resembles cottonseed oil in its proportions of linolenic, oleic and saturated acids. Features in the distribution, cultivation, or harvesting of the seeds under discussion would appear to present certain difficulties in their commercial exploitation as compared with *Tetracarpidium* (conophor), but it is clear that a number of tropical and sub-tropical species of plants produce seeds which yield oils equal or superior to linseed oil in drying properties as indicated by their respective contents of linolenic glycerides. [Authors' summary.]

3355. COLLIER, H. C.
Economic uses of the cashew.
Proc. agric. Soc. Trin. Tob., 1949, **49**: 125-9, reprinted from *Canada-West Indies Mag.*, June 1949.

A popular account of the many uses of the cashew with particular reference to the processing of the nuts. Other products mentioned briefly are the resinous oil with a high iodine value from the kernel shell, the use of the gum of the tree for tanning, of the sap in making ink, and of the " fruit " to produce alcoholic beverages or vinegar. The yield of finished nuts is put at 200 lb. per acre from 48 trees.

3356. PINTO SALVATIERRA, R.
Anotaciones sobre el cultivo de la Sarrapia (*Coumarouna odorata* Aubl.). **(Notes on the cultivation of *Coumarouna odorata*.)**
Agric. venezol., 1946, **11**: 117: 44-7, illus. [received 1950].

Coumarouna spp. [leguminous trees, the seeds of which contain coumarin] grow wild in the tropical areas around Caracas, Venezuela, where the rainfall is high and the soil deep and rich in organic matter. Areas with similar soil and climatic conditions, suitable for the cultivation of *Coumarouna*, may be found in many places along the coast of Venezuela and in the hot, central regions. Both *C. odorata* and *C. punctata* are indigenous, but the seeds of the former have the higher coumarin content. Detailed notes are given on sowing, planting and cultivation. Seeds should be sown within a month of harvesting, as they are liable to germinate in store. They may be sown in normal nursery beds, but the author recommends the use of large seed boxes of wood or bamboo, raised 60 cm. off the ground. This reduces damage by pests and injury to the roots at transplanting time. Seed beds should be shaded by trees or a canopy of palm leaves, and kept well watered. Seedlings are planted out at 12 m. apart as soon as the cotyledons fall, great care being taken not to injure the root system. Pruning is only required during the early years to form a well-shaped tree. Until the trees come into bearing, in about their fifth year, it is considered economical, and even beneficial, to intercrop the plantation with maize, legumes or cotton.

3357. HARTLEY, C. W. S.
***Flacourtia inermis*—Rokam masam.**
Malay. agric. J., 1950, **33**: 93-7, bibl. 5.

Flacourtia inermis is a small bisexual tree common in the Balik Palau district of Penang. The fruits are red berries similar in size to a cherry, and their use for making pickle and jelly is described. Height, girth and yield figures over 1 year are tabulated for 3 trees at Penang and 3 at Serdang. Literature is cited, which indicates that in Ceylon the trees are usually propagated from seed, but in Java by marcots or by budding on *F. inermis* or *F. rukam* stocks.

3358. CRUZ, S. R.
Newspaper as protective wrapper for jackfruits (nangka) against the fruit fly (*Bactrocera umbrosa* Fabr.).
Philipp. J. Agric., 1949, **14**: 213-20, illus.

Enclosing 548 young jackfruits in bags made of a double thickness of newspaper was effective in preventing attack by the fruit fly *Bactrocera umbrosa*, and every fruit was harvested in good condition. The bags survived heavy rain, but had to be renewed twice following storms. By contrast, of 230 uncovered fruits that reached maturity not one was undamaged.

3359. LOOMIS, H. F.
The Nipa palm of the Orient.
Nat. Hort. Mag., 1949, **28**: 1: 4-10 [abstr. in *Econ. Bot.*, 1950, **4**: 149].

The Nipa palm (*Nipa fruticans*) growing on the marshes of the Far Eastern tropics, provides thatch for buildings and materials for baskets, bags, fishnet floats, etc. By tapping the trees a large quantity of sweet juice is obtained, from which sugar, alcohol and vinegar are cheaply produced. It has now been introduced into Florida.

3360. CHEVALIER, A.
La question des *Strophanthus* à glucosides. **(*Strophanthus* species yielding glucosides.)**
Rev. int. Bot. appl., 1950, **30**: 1-15, bibl. in text, illus.

The geographic distribution of, and variations in, different species of *Strophanthus*, are discussed, particular attention being paid to *S. sarmentosus* and related forms and to their ecology. Biochemical studies on members of the genus and on certain other toxic plants from tropical Africa are reviewed. The possibilities of cultivating *Strophanthus* as a crop are considered, and it is pointed out that, as plants can be raised from cuttings or by marcottage, it should be possible to establish clones with a high sarmento-cymarin content.

3361. KRUKOFF, B. A., AND LETOUZEY, R.
Contribution à la connaissance du genre *Strophanthus* au Cameroun français et au Gabon. **(Contribution to the knowledge of the genus *Strophanthus* in the French Cameroons and Gabon.)**
Rev. int. Bot. appl., 1950, **30**: 121-38, bibl. 7.

The distribution, uses and botanical characters of 9 species of *Strophanthus* are described, and keys provided for their identification based on vegetative characters, flowers and fruits.

3362. MURTI, K. S., AND MOOSAD, C. R.
South India vetiver root study.
Amer. Perfumer essent. Oil Rev., 1949, **54**: 113-15, from abstr. in *Soils and Ferts*, 1950, **13**: 707.

Red laterite soil or other rich soil is required for maximum oil yield. The optimum period of growth is 15-18 months. Roots should be harvested in the rainy season or immediately after. Brine manure, groundnut cake, and sulphate of ammonia increase oil content of the roots.

Noted.

3363.
a BEATER, B. E.
The distribution of temperature in the sugar belt of Natal and Zululand.
Proc. 23rd annu. Congr. S. Afr. Sugar Tech. Ass., 1949, pp. 93-9, map.

b BOX, H. E.
Early history of the sugarcane moth borer, *Diatrea saccharalis* (Fabr.), and some modern implications.
Sugar J., 1949, **12**: 2: 3-4, 7-9, illus.

c CAMERON, E. B. G.
A potentiometric method for the determination of reducing sugars.
Proc. 17th Conf. Qd Soc. Sugar Cane Tech., 1950, pp. 217-21, bibl. 1, illus.

d CHEESMAN, E. E.
Classification of the bananas. III. Critical notes on species: (m) *Musa fehi*, (n) *Musa peekelii*.
Kew Bull., 1949, No. 4, pp. 445-52, bibl. in text, illus.

e CHEESMAN, E. E.
Classification of the bananas. III. Critical notes on species: (o) *Musa lolodensis*, (p) *Musa maclayi*, (q) *Musa coccinea*.
Kew Bull., 1950, No. 1, pp. 27-31, illus.

f CLARKE, W. F.
Notes on the vee and stock rails for two foot gauge tram lines [on sugar estates].
Proc. 17th Conf. Qd Soc. Sugar Cane Tech., 1950, pp. 127-30, illus.

g FRASELLE, E.
Le problème des cycles en climatologie congolaise. **(The problem of climatic cycles in the Belgian Congo.)**
Bull. agric. Congo belge, 1950, **41**: 411-26, bibl. 10.

h GUPTA, N. C. D.
Sugarcane tops as cattle feed in the United Provinces.
Indian Fmg, 1949, **10**: 539-40, bibl. 3.

GUPTA, S. S., AND MEARA, M. L.
The configuration of naturally occurring mixed glycerides. Part VI. The component fatty acids and glycerides of stillingia tallows.
J. chem. Soc. Lond., 1950, pp. 1337-42.
From the Chinese tallow tree, *Sapium* (*Stillingia*) *sebifera*.

j HATT, H. H., STRASSER, P. H. A., AND TROYAHN, W. J.
The refining and bleaching of sugar cane wax. Studies in waxes, Part II.
Proc. 17th Conf. Qd Soc. Sugar Cane Tech., 1950, pp. 61-81, bibl. 13, illus.

k HOBBES, J. C.
The Manila hemp problem in the Philippines.
World Crops, 1950, **2**: 79-82, illus.
Abridged version of the article abstracted in *H.A.*, 20: 404.

l HOLTTUM, R. E.
The Zingiberaceae of the Malay Peninsula.
Gdns Bull. Singapore, 1950, **13**: 1-249+ 33 figs.

m HOUGH, L., AND JONES, J. K. N.
The structure of *Sterculia setigera* gum. Part II. An investigation by the method of paper partition chromatography of the products of hydrolysis of the methylated gum.
J. chem. Soc. Lond., 1950, pp. 1199-1203.

n MAIER, E. A.
Soil preparation for sugarcane.
Sugar J., 1950, **13**: 1: 14-16, illus.
A general outline with notes on machinery.

o MENON, N. S.
Compost as manure for coconuts.
Indian Coconut J., 1950, **3**: 91-4.

p NARASIMHASWAMY, R. L.
A brief history of coffee breeding in South India.
Mon. Bull. Indian Coff. Bd, 1950, **14**: 83-6, 112-13, bibl. 8.

q PEMBERTON, C. E.
Notes on the life history of the sugar cane leaf hopper [*Perkinsiella saccharicida* Kirk.].
Hawaii. Plant. Rec., 1950, **53**: 205-10, illus.

r RILEY, J. P.
The seed fat of *Parinarium laurinum*. Part I. Component acids of the seed fat.
J. chem. Soc. Lond., 1950, pp. 12-18.

s SINCLAIR, K. B.
Sugar production in Rhodesia. The Triangle sugar estates: an irrigation system.
S. Afr. Sugar J., 1949, **33**: 589-93.

t SPRING, F. S., AND STARK, J.
Piperettine from *Piper nigrum*; its isolation, identification, and synthesis.
J. chem. Soc. Lond., 1950, pp. 1177-80.

u SUMMERS, E. M., BRANDES, E. W., AND RANDS, R. D.
Mosaic of sugarcane in the United States, with special reference to the virus.
Sugar J., 1949, **12**: 6: 19-25.
A short version of *Tech. Bull. U.S. Dep. Agric.* 955 [*H.A.*, 18: 2940].

v WHITSON, C.
Relative cane payment systems. Schemes (a) and (b).
Proc. 17th Conf. Qd Soc. Sugar Cane Tech., 1950, pp. 231-6.

STORAGE AND PLANT PRODUCTS.

Storage.

(*See also* 2286, 2385, 2647, 2966-2971, 2992, 2993, 3076.)

3364. Bradford, E. A. M.
Quality control in French Morocco.
Food, 1950, **19**: 297-300, illus.

A strict system of control of export foodstuffs operates in Morocco. A description of the preparation of fresh fruit and vegetables for export, and of subsequent examination is given.

3365. Biale, J. B.
Postharvest physiology and biochemistry of fruits.
Annu. Rev. Plant Physiol., 1950, **1**: 183-206, bibl. 85.

" The purpose of this review is to evaluate the present status of the research problems in the field of post-harvest physiology of the major fruits used by man as a source of food. The intention of the reviewer is to compare the behaviour of the various species for which sufficient experimental results are available, rather than to present a full account of all published studies." The subject is considered under the following headings: Methodology, the normal course of respiration, factors affecting the climacteric rise, and the production of ethylene by fruits. In conclusion, the author emphasizes the fact that the main theme of the review was the physiological changes in fruits which precede, and are associated with, senescence, attention being focused constantly on the climacteric rise in respiration as the critical stage which separates the stages of development and maturation from that of functional breakdown.

3366. Baudewijn, J., and de Donnea de H., R.
La conservation des fruits. **(Storage of fruit.)**
Rev. Agric. Brux., 1949, **2**: 1027-48, bibl. 10, illus.

The author discusses the need for the erection of more fruit stores in Belgium and describes in detail, with the aid of diagrams, the construction of a natural store. He then deals with the way of handling fruit for storage, disorders of fruit in storage, disinfection of the store, and other methods of storage, including the Krebser system, refrigerated and gas storage.

3367. Statens Forsøgsvirksomhed i Plantekultur.
Opbevaringsforsøg med aebler i forskellige typer af frugtlagre. **(Storage trials with apples in different types of storage installation.)**
Erhvervsfrugtavl., 1950, **16**: 319-21.

From 1940 to 1948 storage trials with the more common Danish apple varieties, including Belle de Boskoop, Bramley's Seedling, Cox's Orange, Cox's Pomona, Jonathan and Laxton's Superb, were carried out at Blangstedgaard research station. In general, the best results were obtained with cold storage at 2·5° C., while gas storage (5% CO_2: 2-3% O_2) proved less satisfactory. There was no incidence of Jonathan spot in the latter type of installation, but most varieties showed a tendency to develop scald, and others—among them Boskoop and Cox's Orange—an increased susceptibility to internal breakdown. In ordinary ventilated storage the keeping quality was much inferior to that in either of the two other methods. Observations on the storage behaviour of 15 apple varieties are recorded.

3368. Smock, R. M.
Do apples keep better with air purification ?
Amer. Fruit Gr., 1950, **70**: 7: 18, 24-5.

On visits to many air purification installations in New York the author gained the impression that operators are generally satisfied, provided they do not expect too much, viz. a substitute for low storage temperatures. For best results the following conditions must be fulfilled: (1) Use of the right type of activated carbon. To date, coconut shell carbon has been most satisfactory, (2) use of the right amount of carbon (approximately 6 lb. per 1,000 bushels of apples), (3) sufficient air movement through even beds of carbon (approximately 100 cubic feet of air per minute through each 6 lb. of carbon), and (4) good air distribution of the " purified " air around the storage room.

3369. Kobel, F.
Eine eigenartige Sektorialchimäre. **(A peculiar sectorial chimaera.)**
Schweiz. Z. Obst- u. Weinb., 1950, **59**: 217-18.

In an experiment on the control of scald an apple of the variety Bohnapfel was discovered of which one clearly delineated section of the skin was badly affected by scald, while the remainder was sound. The observation suggests that the local susceptibility to the disease is due to a mutation and that consequently the fruit is a sectorial chimaera. This indicates that scald resistance is genetically controlled and the most careful selection of scion wood is necessary.—Wädenswil research station.

3370. Borgström, G.
Päronlagringens problem. **(The problem of pear storage.)**
Sver. pomol. Fören. Årsskr., 1949, **50**: 82-104, bibl. 103.

The extensive review of the literature shows that keeping quality and aroma in pears cannot be maintained in ordinary storage without refrigeration. The Swedish trade is urged, therefore, to create the necessary facilities.

3371. Östlind, N.
Försök med korttidsförvaring av jordgubbar och hallon 1949. **(Short-period storage trials with strawberries and raspberries in 1949.)**
Sver. pomol. Fören. Årsskr., 1949, **50**: 162-71.

In trials at Alnarp it was shown that pliofilm and similar materials cannot be used in the storage of strawberries and raspberries as they impair fruit quality, a drawback which does not compensate for the reduced loss in weight resulting from evaporation. Cooling the berries after picking was found to be beneficial. A comparison of 1948 and 1949 results led to the tentative conclusion that a temperature of +9 to 10° C. is as effective as +6° C. Whether a lower temperature than +6° C. would give still better

results has not been ascertained. Probably the rate of cooling is of considerable influence on storage quality. In experiments, in which a temperature of +6° C. was used, it took 8-10 hours for the temperature in the centre of a chip to drop to that of the surrounding air.

3372. JOHNSON, H. B.
Control of post-harvest decay in citrus fruit.
Proc. 4th Annual Rio Grande Valley hort. Inst., 1950, pp. 83-9, bibl. 20.
In a review of the literature on post-harvest decay of citrus fruits the author discusses the four fungi mainly responsible, chemical dips, fumigants with fungicidal properties, chemically treated wraps, refrigeration and recent innovations with commercial possibilities.

3373. SUHAČEV, A. D.
New method of keeping fruits and berries in fresh condition. [Russian.]
Sad i Ogorod (Orchard and garden), 1950, No. 5, pp. 25-8, bibl. 1, illus.
In trials at Kuibišev Agricultural Institute it was found possible to keep gooseberries and unstrigged black, red and white currants in good condition for 5 months by putting them in an airtight desiccator at 18-20° C. with a layer of grated horseradish at the bottom. Apples and other fruits were similarly and successfully stored. Their preservation is attributed to antibiotic substances which emanate from horseradish (as also from onions and garlic) which kill or check the growth of bacteria and fungi.

3374. MILOVANOVA, L. V.
The characteristics of varieties of table grapes during storage. [Russian.]
Vinodelie i Vinogradarstvo (Wine-making and viticulture), 1950, No. 7, pp. 21-3.
A study of the changes that take place in the chemical composition of grapes during storage, with reference to simple sugars, polysaccharides, pectins, titratable acidity, glucoacidimetric index, and moisture.

3375. LANZA, F.
Sulla conservazione delle castagne destinate all'esportazione. Nota II. Ricerche sperimentali di lotta contro le infezioni crittogamiche (disinfezione chimica). **(Storage of export chestnuts. 2. Tests of the fungicidal effects of ethylene chloride and methyl bromide.)** [English summary 12 lines.]
Ann. Sper. agrar., 1950, **4** (N.S.): 321-8, bibl. 12.
Trials at the Stazione Chimico-Agraria Sperimentale at Rome indicate that stronger concentrations of these substances are necessary than are suggested by Wheldon *et al.* in *Food and Industries*, 1946, Vol. 18. Their fungicidal effect suffices only if the treatment is prolonged considerably beyond that necessary for insect disinfestation. The combination of insecticidal and fungicidal control in one treatment is not yet practicable.

3376. WINTERINGHAM, F. P. W., BRIDGES, R. G., AND HARRISON, A.
Potentiometric analysis of bromide-chloride mixtures at low concentrations. Application to fumigant mixtures.
J. Sci. Fd Agric., 1950, **1**: 185-9, bibl. 24.
The paper describes the application of a simple potentiometric method to the analysis of binary mixtures of methyl bromide with chloropicrin, ethylene dichloride or carbon tetrachloride.—Pest Infestation Lab., D.S.I.R., Slough, England.

3377. MUKULA, J.
Säilytysaineiden käytöstä porkkanan varastoimisessa. **(The chemical control of storage rot in carrots.)** [English summary 1½ pp.]
Maataloust. Aikakausk., 1950, **22**: 86-92, bibl. 4.
Treatment with Fusarex at the dosage recommended by the manufacturers reduced storage rot (*Botrytis* and *Sclerotinia*) in carrots from 25-71% in the controls to 6-15%, provided the carrots were healthy and whole and were kept in closed boxes. Similarly favourable results were obtained with Belvitan K, another proprietary substance, while sand or peat covering had only a slightly beneficial effect. In these experiments, carried out at the Agricultural Research Institute, Tikkurila, Finland, the temperature varied from 2 to 6° C. and relative humidity from 70 to 95%.

Plant products.

(*See also* 2398, 3025-3030, 3035-3037, 3040-3042, 3103g, 3187, 3189, 3207, 3217, 3235, 3254-3257, 3359-3362, 3363 c, h, i, j, m, r, t, 3420.)

3378. CHARLEY, V. L. S.
Fruit products for hospital and welfare work.
Reprinted from *Nutrition: Dietetics: Catering*, 1947/8, Vol. I, No. 4, pp. 8 [received 1950].
Those interested in the Bureau's latest publication on Fruit juice production [see cover p. iii] may care to read the same author's paper on the dietetic value of juice and similar fruit products.

3379. KOCIÁN, L.
Stanovení vlhkosti v surovinách a produktech ovocnického průmyslu. **(Moisture determination in raw materials and products of fruit-industry.)** [English and Russian summaries 1 p. each.]
Acta Univ. Agric. Silvic. Brno, Sign.**C47**, 1949, pp. 51, bibl. 144.
The paper deals primarily with the evolution of a satisfactory method of moisture determination in fruit pulp, juice, syrup, jam and dried fruits and vegetables. A comprehensive survey of literature is given.

3380. TROUT, S. A.
Quick freezing and canning fruit and vegetables.
Fruit World, Melbourne, 1950, **51**: 7: 15, 17.
In his broadcast the Director of Horticulture, Queensland Department of Agriculture, compares conditions in Australia and the U.S.A. " A considerable amount of research is necessary in Australia to determine varietal suitability, optimum stage of maturity, processing methods and suitable type of container. . . . In Queensland quick freezing should be a satisfactory

method of preserving strawberries, bananas, papaws and tropical fruit salad."

3381. Federico, L., Monzini, A., and Valle, T.
Contributi alla conoscenza del contenuto vitaminico dei prodotti agrari e d'uso agrario. Nota I. Contenuto in Vitamina B_1 di ortaggi, frutta, foraggi e mangimi. **(Vitamin content of vegetables, fruits, fodder and other feeding stuff. I. Vitamin B_1 content.)** [English summary 3 lines.]
Ann. Sper. agrar., 1949, **3** (N.S.): 949-53, bibl. 4.

Figures are given of the result of analyses made at the Refrigeration Research Station of Milan by Pyke's method (*Bioch. J.*, 1937, 31: 1958) modified by Antoniani and Federico, *Ann. Sper. agrar.*, 1948, Vol. 2 (N.S.), No. 1. They give the vitamin B_1 content of onions, leeks, parsley, asparagus, rape, chicory, globe artichoke, carrot, bean, fennel, lettuce, peas, tomato, potato, spinach, kaki, orange, a number of apple and pear varieties, groundnuts, figs, almonds and walnuts.

3382. Federico, L., and Valle, T.
Contributi alla conoscenza del contenuto vitaminico dei prodotti agrari e d'uso agrario. Nota II. Contenuto in vitamina C degli ortaggi. **(The vitamin content of produce and products used on the farm. II. Content of vitamin C in vegetables.)** [English summary 2 lines.]
Ann. Sper. agrar., 1950, **4** (N.S.): 219-22.

Figures are given of percentage of vitamin C in common vegetables in fresh and dry weights taken in the field and at the market. The loss of vitamin C between field and market was found to range from nil in tomatoes via 33% in asparagus to 90% in potatoes.

3383. Popovskaja, E. M.
The formation and translocation of ascorbic acid in plants. [Russian.]
Biohimija (Biochemistry), 1950, **15**: 249-55, bibl. 14.

Ascorbic acid is formed in the leaves and is transported to other organs of the plant. In ringing the leaves above the ring become richer in ascorbic acid than those below it. Data concerning the ascorbic acid content of dog-rose, tomato, potato, and peas are tabulated.

3384. Huelin, F. E.
Investigations on the stability and determination of dehydroascorbic acid.
Aust. J. sci. Res., Ser. B, biol. Sci., 1949, **2**: 346-54, bibl. 4.

Studies are described on the reduction, stability and determination of dehydroascorbic acid. Figures tabulated for contents in fresh and processed foods showed an appreciable concentration in immature fresh apples and negligible amounts in tomatoes and beetroot. Fresh apple juices showed significant increases resulting from oxidation of ascorbic acid during extraction. With orange juice the concentration was low because oxidation proceeds slowly in this product. In canned juices concentrations were negligible owing to destruction of practically all the dehydroascorbic acid through heat sterilization combined with long storage.—C.S.I.R.O.

3385. Turnbull, R. F.
The taxonomy, harvesting, processing and utilization of eucalyptus trees in Australia.
Econ. Bot., 1950, **4**: 99-131, bibl. 11, illus.

This paper deals mainly with timber production and utilization, though mention is also made of extraction of tanning materials and of the use of the wood for fuel, paper pulp, etc. Annual eucalyptus oil production in Australia amounts to approximately 230,000 gallons. The oil contents of the leaves of eucalypt species are given, and their principal constituents and uses are enumerated. Of the 500 species known in Australia, about 60 are economically important.

3386. Lewis, T., and Woodward, E. F.
Papain—the valuable latex of a delicious tropical fruit.
Econ. Bot., 1950, **4**: 192-4, adapted from *Drug and Cosmetic Industry*, 1948, **63**: 734.

Papain is the dried and purified latex obtained from green fruit of papaya (*Carica papaya*). Notes on its uses are given.

3387. Miller, D. J.
Report on quinine.
J. Ass. off. agric. Chem. Wash., 1950, **33**: 192-4, bibl. 7.

For reasons given it is recommended that the present tentative method for the separation of quinine and strychnine be withdrawn.

3388. Kurtz, E. B., Jr.
The relation of the characteristics and yield of wax to plant age.
Plant Physiol., 1950, **25**: 269-78, bibl. 13.

The relationship of physical and chemical characters and yield of wax to plant maturity was studied in 13 species of plant. The effect of plant age on wax yield varied with the species, but in most cases it was directly related to the thickness of the cuticle. This indicates that the main source of wax is the cuticle. The melting point did not change markedly with age, but in some species there was a slight increase, correlated with a decrease in wax unsaturation. The amount of wax acids decreased rapidly in young plants, and then slowly increased as the plants matured. The colour and odour of the wax and non-wax fractions were directly related to the type of pigmentation and odour of the plant. No relationship was found between carbohydrate and lipid content.—University of Arizona, Tucson.

3389. Tondeur, R.
Recherches chimiques sur les alcaloïdes de *l'Erythrophleum.* **(Chemical investigation of the alkaloids of *Erythrophleum.*)**
Publ. Inst. nat. Ét. agron. Congo belge (*hors série*), 1950, pp. 52, bibl. 30.

The alkaloids known to occur in *E. guineense* and other *Erythrophleum* species are remarkable for their physiological properties which are akin to those of the glucosides of *Digitalis* and at the same time have the effect of a local anaesthetic.

Noted.

3390.

a BALAHOVSKIĬ, S. D., TROICKAJA, N. A., AND KOLESNIKOVA, N. V.
The physiological action of substances yielding vitamin A in relation to their structural change. [Russian.]
Biohimija (Biochemistry), 1950, **15**: 267-71, bibl. 23.

b BARKER, B. T. P.
A preliminary trial of yeasts for the dominant fermentation of ciders.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 131-6, bibl. 7.

c BARKER, B. T. P.
An investigation of the yeast flora of Kingston Black ciders. Part I.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 137-44, bibl. 5.

d BURROUGHS, L. F., AND CHALLINOR, S. W.
The rôle of nitrogen in fermentation. III. Further observations on the nitrogen changes which occur during fermentation and preliminary observations on the associated changes in phosphorus.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 115-30, bibl. 9.
Bramley apple juice was used in these studies.

e CRANG, A., AND KENDALL, L.
The inactivation temperatures of the oxidase enzymes in plums and apples.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 163-7, bibl. 2.

f HARVEY, E. M.
Refrigeration of lemons in transit.
Calif. Citrogr., 1950, **35**: 319, 342-4.

g HAWES, M. J., AND BURTON, H. B.
The ascorbic acid content of east Texas home-canned and commercially canned tomatoes and blackberries.
Proc. 37th annu. Mtg Okla Acad. Sci. for 1948, 1950, pp. 12-15, bibl. 5.

h KIESER, M. E., POLLARD, A., AND STONE, A. M.
The clarification of apple juice. II. The estimation of pectic enzyme activity.
A.R. Long Ashton agric. hort. Res. Stat. 1949, 1950, pp. 153-9, bibl. 7.

i SHAW, A. C.
The essential oil of *Picea mariana* (Mill.) B.S.P.
Canad. J. Res., Sect. B, 1950, **28**: 268-76, bibl. 13.

j WADE, P., AND HANNEN, J.
Iodometric determination of caffeine.
J. Sci. Fd Agric., 1950, **1**: 177-8, bibl. 3.

NOTES ON BOOKS AND REPORTS.

Books and reports.

3391. ANDREWS, F. W.
The flowering plants of the Anglo-Egyptian Sudan. Vol. I (Cycadaceae-Tiliaceae).
Published for the Sudan Government by T. Buncle & Co. Ltd., Arbroath, Scotland, 1950, 9×5½ in., pp. 237, illus., 21s.

This book is compiled by the Chief Economic Botanist to the Sudan Government. After an introduction and outlines of plant description with an index of botanical terms, a key is given to the principal groups of plants and artificial keys to the families of Angiospermae represented in this flora. Then follows a systematic list of the plants with relevant descriptions of the species and the localities where found. A coloured map shows the five ecological regions of the country. It is copiously illustrated by line drawings; the first nine show the general morphology of flowering plants to explain the terms used, while Figures 10 to 124 show the habit and floral structure of 115 of the plants described. It must be invaluable for the botanist who is interested in the natural plants of this part of Africa.

3392. BEDDALL, J. L.
Hedges for farm and garden.
Faber & Faber, Lond., 1950, 8½×6 in., pp. 360, illus., 25s.

People in every walk of life are interested in hedges—the farmer to keep his livestock from straying, the fruit-grower to keep out trespassing animals and to provide shelter from winds, the gardener to secure privacy or to form a background to flower borders, the town planner to provide amenities that often must also serve a practical purpose, and the man-in-the-street to add to his enjoyment of the countryside, for it is broken up and diversified by hedges of every description. J. L. Beddall in bringing together so much information on hedges is sure of a wide circle of readers. The book runs to thirty chapters subdivided into sections on Farm Hedges, Garden Hedges and Miscellaneous. This arrangement leads to some repetition, but on the whole this is not obtrusive.

Chapter 1 surveys the different types of hedge, from hedges of thorn to dry stone walls, barbed wire and single strand electric fences. Chapter 2 recounts their history and the part they have played in land enclosure and in the change from common land and open field to the modern long-term farming rotation. Chapter 3 makes a convincing case, on utilitarian and aesthetic grounds, for hedges as opposed to fences. Chapters 4 and 5 give detailed advice on the selection of hedge plants and trees for the farm; incidentally, the advice given here regarding Myrobalan, that it should be winter sprayed, is likely to cause injury if carried out. Chapter 6 deals with the problem from the fruit-grower's viewpoint and much space is given to consideration of air drainage and frost in relation to the siting of hedges. The brief exposition on the theory of frost damage, as due to the mechanical rupturing of cells by ice formation inside them, is probably not acceptable to all those working on the problem. After referring to the advantages and disadvantages of various hedges, the author concludes, as do so many writers

on this subject, without making any definite recommendations but with the sage remark :" The problem can only be solved on the site bearing in mind all these suggestions ". The planting and care of hedges, including tools and mechanical clippers, occupy Chapters 7 and 8.

Chapter 9 describes stone and turf fences, Chapter 10 hurdles, and wooden and other fences, Chapter 11 deals with gates and stiles in a most thorough and interesting way, but the diagram 10A on p. 94 is wrongly drawn and captioned for a self-closing gate. The text rightly describes such a gate as having the upper hook, not the lower hook, as the projecting one. Chapter 12 reviews methods of grubbing hedges and draws attention to plants poisonous to livestock that are likely to grow up after clearing a hedge.

Chapter 13 is a general discussion of the possibilities of hedges in gardens, calling attention to the need for careful planning before planting both as regards space, and the flowers and plants that are to come near them. Chapter 14 makes suggestions for hedge plants with a plea for the less usual ones. The effective use of colour in hedges is discussed. Chapter 15 surveys many purposes, including the needs of town and country gardens, fruit gardens, beekeepers, entomologists and protection from stock. Bamboos are said to be perfect cat and dog excluders, but wire netting is needed for rabbits. Chapter 16 shows how hedges can serve as screens and windbreaks, chiefly to divert wind, not to stop it, but adds a caution that no hedge will grow in a chilly draught between buildings. Chapter 17 deals with plants to withstand seaside conditions. Chapters 18-23 cover the ordering of plants, soil preparation, planting, training and trimming, tabular guides for treatment, renovation and transplanting. Chapter 24 describes methods of propagation, ordinary layering, stool and mound layering, but omits mention of the necessary etiolation of Myrobalan when propagated by layering.

The Miscellaneous section contains a chapter on hedges for parks and one on the legal aspects. Chapter 27 deals with pests and diseases in a reasonably satisfactory manner. It might have been wise to insert a caution on the handling of some of the materials mentioned, especially such inflammable materials as carbon bisulphide. The final three chapters cover the relative costs of different sorts of hedges and give lists of plants for all sites and purposes and a list arranged in alphabetical order. A glossary and index complete the book, which is beautifully illustrated by line drawings and first-class photographic plates. The story is most pleasantly told in a personal manner and is worth reading whether or not one wishes to plant hedges. This is certainly a book to buy, read and keep for reference, not one to borrow. H.B.S.M.

3393. BEWLEY, W. F.
Commercial glasshouse crops.
Country Life Ltd., London, 1950, 10×8 in., pp. 508+128 illus., price 50s.

The twelve chapters of this large volume cover the whole field of glasshouse cropping. No single book has ever before dealt so exhaustively with flowers, fruit and vegetables under glass; it is both literally and figuratively a *magnum opus*. It represents the accumulated knowledge and experience of the author, for over thirty years Director of the Cheshunt Experimental Station, from the results of which he draws most of the data to support his arguments.

The first chapter deals with the planning and building of a glasshouse nursery and gives a wealth of detail on choice of site and location, the construction of standard type timber houses and the more usual methods of heating. There is, unfortunately, no mention of metal or concrete houses and hence no discussion of their merits and demerits, a matter of very considerable argument at the present time, when there is still difficulty in obtaining adequate supplies of well-seasoned timber. Similarly, the new development of heating by low pressure steam receives little or no discussion, although many growers are now favouring it on grounds of economy of running costs and more accurate temperature control. Chapter 2 is concerned with the soil, and is a clear and lucid account of the principles of plant nutrition, soil management, the maintenance of fertility and the use of fertilizers. The value of soil warming by hot-water pipes or by electric cables or low-voltage wires is discussed, with special regard to tomatoes and bulbs.

Chapter 3 is a complete guide to tomato growing and, as might be expected, is by far the longest chapter in the book. The notes on the history of the tomato and the classification of the genus *Lycopersicon* are interesting, and the descriptions of the fourteen groups into which the commercial varieties of tomato fall are useful, though more detail, especially of leaf characters, would be helpful in the identification and recognition of varieties. Attention is drawn to the need for careful selection in the maintenance of varieties, well illustrated by the Cheshunt strain of Potentate, a variety which, if unselected, produces many large irregular fruits of poor flavour, though its heavy cropping qualities make it perhaps the most widely grown of all. A valuable section deals with the interrelation of light, temperature and nutrition on the growth and cropping of the plant. No mention, however, is made of the work of Hoagland in California on the inhibitory effect of high night temperatures on the initiation of flowers, though the more empirical results obtained at Cheshunt bear out his fundamental studies.

The difficult art of watering tomatoes, which the author so rightly stresses as the all-important factor in management, receives the detailed consideration to be expected from Dr. Bewley, the originator of winter flooding and overhead damping. Yet a detailed account of the blemishes which reduce the market value of fruit includes no mention of " blossom-end rot ", a most surprising omission in view of its connexion with the water-factor and the author's own work on this disorder.

The growing of tomatoes in low houses such as cucumber houses by methods evolved at Cheshunt during the war, is described in detail and a section is devoted to tomatoes under lights and cloches and in the open.

The growing of cucumbers, melons, lettuce and general vegetable crops is described in Chapter 4. In the section on lettuce more discussion of the merits of the different varieties and their characteristics would be valuable, and the all-important point of the need for the utmost care in handling the young seedlings in planting out to avoid *Botrytis* infection is not stressed, though it has been demonstrated beyond question

that damage to the cotyledons at this stage is fatal. Chapter 5 deals with fruit crops, namely grapes, peaches, figs and strawberries. While the idea of allowing peach trees to fruit from the maiden year, as practised by some growers, is discussed, no mention is made of the method of growing these trees on frames set transversely across the house, which allows of considerably larger crops, though less use can be made of the house in winter.

Chapters 6, 7 and 8 are concerned with cut flowers, bulbs and pot plants respectively. To many growers the first of these will be very valuable, as so little reliable information is available on the growing of certain flower crops, especially orchids, roses, gardenias and sweet peas. In the chapter on bulbs an account is given of the Dutch work on the " preparation " of bulbs for forcing; though three references are cited, one of these is in Dutch and another in a little-known journal, while no reference is made to the excellent articles by Miss Purvis in *Scientific Horticulture*, Vols. 5 and 6.

The description of the growing of pot plants for market in Chapter 8 is valuable, but rather less than justice is done to the work of Lawrence at the John Innes Horticultural Institution, either here or elsewhere.

Disease and pest control is dealt with in Chapter 10; this is not intended to be a guide to the control of all troubles of glasshouse crops, but is concerned mainly with general hygiene, soil sterilization and the uses of insecticides and fungicides. As the originator of steam sterilization, Dr. Bewley justifiably devotes considerable detailed attention to this important subject.

An interesting historical survey of the glasshouse industry traces its growth from its beginning less than a hundred years ago and discusses the impact on it of two wars and of intensive research in the last half-century.

The final chapter is concerned with some recent applications of science to glasshouse crops and deals with such diverse subjects as soilless cultivation, irradiation of growing crops, photoperiodism and the uses of growth-regulating substances. In the first-mentioned subject one might venture to suggest that the recommendations on nutrient solutions could be simplified by discussing the requirements of plants for the nutrient elements in terms of " parts per million " and providing a table of factors for the commoner salts, relating their composition to the amounts required to provide a given concentration. This would greatly facilitate calculation of the variation in the concentrations of the principal nutrients according to the stage of growth of the plants and to the weather. R.H.S.

3394. Caillavet, H., and Souty, J.
Monographie des principales variétés de pêchers. **(Monograph on the more important peach varieties.)**
La Maison Rustique, 26 Rue Jacob, Paris VI^{e}, 1950, 11×8½ in., pp. 416, illus.

A renewed interest in peach growing amongst English fruitgrowers was noticeable even before the appearance in 1947 of Mr. Justin Brooke's book, *Peach Orchards in England*. It is at least arguable that this revived interest is mainly due to a progressive climatic change, bringing appreciably warmer summers than were prevalent 30 or 40 years ago. It may now be further stimulated by this magnificent work of two French pomologists on peach and nectarine varieties. It must be said at once, however, that even amongst the 363 varieties described by the authors, many well known in England are omitted. Whilst some 10 varieties of English origin are included, and also some of French and American origin well known in England, such as Grosse Mignonne Hâtive and Hale's Early, others, of much importance in English outdoor peach growing are not even mentioned, including both Peregrine and Rochester. The book will thus be of more interest to gardeners than to commercial growers.

But its prime interest will be to the systematic pomologist. The authors are unduly modest in describing their objects: " To establish methods of reliable identification; to reduce to order the nomenclature of varieties, and thus give to those interested the possibility of obtaining a guarantee of trueness to name; and finally to indicate the most important varieties. We do not pretend to do more." Yet they have certainly accomplished more.

The book might be said to mark a new step forward in methods of systematic pomology. The scope and completeness of the authors' system of classification is shown by their use of only 49 of the 168 possible groups into which they divide varieties. Their system is based, first, on downy and smooth skin (peaches and nectarines); secondly on colour of flesh—white, yellow, or red; thirdly on flower shape (*not* size); fourthly on the free- and cling-stone character; fifthly on the absence, or shape when present, of the petiole glands; and sixthly on the colour of the flesh next the stone.

Their descriptions also are very complete. They include every character that might be useful for identification, as well as notes over a 10-year period on the susceptibility of each variety to certain diseases and to frost injury. The 15 colour plates are particularly fine, showing, as do also the 60 additional black and white plates, the characters of foliage, shoot and blossom, fruit (in three aspects), and stone. Descriptions of all the varieties are also given in tabular form.

The classification makes possible, for the first time so far as the present reviewer knows, a large-scale analysis of variety characters and their correlation. The proportion of varieties with certain characters is, of course, much influenced by selection, and can have no genetic significance. Thus of the 363 varieties, nearly 89% are free-stone, obviously because free-stone varieties are preferred. A curious instance of correlation, which seems unlikely to be influenced by selection, appears in the classes based on flesh colour and flower shape: in the white-fleshed class the two flower shapes occur in nearly equal numbers, whilst in the yellow-fleshed class over 80% have " campanulate " flowers. N.H.G.

3395. Crowther, D. S.
Fruit for small gardens.
Collingridge, London, 1949, 7×5 in., pp. 152, illus., 6s.

This little handbook is just what the amateur fruit-grower has been waiting for. It is full of helpful, practical advice without being too technical. It gives valuable suggestions on how to make the best use of the land at one's disposal, so often a matter of making the best of a bad job. It explains the fundamental

principles of pruning and manuring and, an admirable achievement, describes briefly and simply the various methods of pruning and training. Its recommendations concerning pest and disease control and choice of rootstocks are up to date. It suggests selections of varieties, including some very recent introductions, specially suitable for the home garden. Both photographs and line drawings are good and to the point. And it costs only six shillings. P.R.-D.

3396. Darlington, C. D., and Mather, K.
The elements of genetics.
G. Allen & Unwin Ltd., London, 1950, 9 × 5½ in., pp. 446, bibl. numerous, illus., price 30s.

It is now more than forty years since Bateson wrote his famous textbook *Mendel's Principles of Heredity*, and it is evidence of his thoroughness that no successor worthy to take its place has appeared during that long period. Yet, while Bateson's work could hardly be bettered, it has for long been clear that it only recounts the opening chapters of what has now developed into a great adventure story. It is but fitting that another director of the John Innes Institution should have undertaken the task of bringing into the compass of a single book the fascinating story of the development of genetic science from its earliest beginnings. *The Elements of Genetics* by Dr. Darlington with the able collaboration of his sometime colleague, Professor Mather, is in every way worthy to stand beside Bateson's famous book, as the geneticist's *vade mecum*. Only those of us who can look back on the earlier days of the science can perhaps fully appreciate how far and how fast genetical discoveries have taken us. The long struggle for the recognition of the chromosomes as the carriers of the hereditary principle is now forgotten, the inevitable reaction from the too rigid conception of the genes as the carriers of fixed unit characters is in full flood, and now Darlington and Mather have provided an ingenious explanation, in full consonance with accepted genetic theory, for those cases of continuous variation which were regarded for so long by the biometricians as obstacles to the full acceptance of the Mendelian laws of inheritance.

Not only have the authors brought to their task a rare talent for welding a mass of facts into a lucid and interesting narrative and of drawing from it theories that are at once clear and convincing, they have also not hesitated to carry the reader beyond the region of firmly established fact to glimpse the faintly emerging contours of the undiscovered regions of the future. Their observations on the nature of viruses may not be acceptable to every school of thought, but they have provided a plausible explanation of phenomena not otherwise very easy to understand. In many other instances they have been able to show how genetics can provide the answer to mysteries not readily soluble by any other means.

It was perhaps inevitable from the personal preoccupations of the authors that cytology and the mechanics of the cell should receive what may be considered by some as a disproportionate emphasis. While this may tend to obscure the claims to historical precedence of the older experimental breeding techniques as practised by Mendel and Bateson, there is a distinct gain in clarity from having the observed phenomena of plant and animal behaviour related directly and unambiguously to their source in the cell nucleus.

In reading this book it is difficult to resist the infectious enthusiasm of the authors which emerges from almost every page, and one is constrained to succumb to their enchanting vision of a future in which genetics will occupy a central and paramount position among the natural sciences. It may be confidently anticipated that this work will take its place as the standard textbook of genetics. It is written in a manner that will claim the immediate interest of the veriest beginner, yet it contains much that can be read with profit by the veteran practitioner. H.M.T.

3397. Githens, T. S.
Drug plants of Africa.
being *African Handbook No.* 8.
University of Pennsylvania Press, Philadelphia, 1948, 8½×5½ in., pp. 125, selected bibliography 57 [received 1950].

After describing briefly the chemical basis for the use of drug plants, the author discusses their utilization under four headings: (1) Plants used primarily for purposes other than medicinal; (2) plants, not native to Africa, that are now cultivated there for local use or export; (3) plants used by Africans mainly as arrow or homicidal poisons, etc.; and (4) indigenous and introduced plants used by native medicine men in the treatment of bodily ailments. Pages 42-122 are devoted to tables, which contain details of plant drugs exported, including flavourings, spices, resins, dyes, tannins, oils and medicinal plants; imports, mainly into the U.S.A.; generic synonyms; the chemical basis of drug action, divided according to the principles contained, i.e. tannins, saponins, cardiac glucosides, bitter principles, alkaloids, essential oils and resins; and drug plants listed as to their regions, part of the plant used, principles, and uses. This book may be regarded as a useful and comprehensive work of reference on a subject which, so far as we are aware, has never been dealt with thoroughly in the past. G.K.A.

3398. Hagedoorn, A. L.
Plant breeding.
Crosby Lockwood & Son, London, 1950, 8½×5½ in., pp. 237, bibl. 36, price 12s. 6d.

This is a very useful little book which can be profitably studied by all engaged in plant breeding whether as professionals or amateurs. The author brings to his subject a wealth of experience gained during a lifetime's work on a wide variety of crops under many different conditions. Although the theoretical side of the subject is dealt with adequately and in a manner at once simple and interesting to persons unaccustomed to complicated scientific arguments, it is in the assistance and advice provided on the more practical problems confronting the plant breeder that this book is chiefly valuable. The author deals with every aspect of his very wide subject, wisely separating the more theoretical aspects from those of a more practical description. The exposition of genetical theory, although necessarily much condensed, is sufficient for an understanding of the elements of the subject and the author resists the temptation to overload his discussion with obscure technicalities. That part which deals with the

practice of plant breeding everywhere reflects the author's wide practical experience and abounds in wise counsel and useful hints. Whether the crop under discussion is sugar beet or tropical fruit, Dr. Hagedoorn has something helpful and interesting to say about the best methods for its improvement.
The book is well illustrated and in its general format conforms to the high standards we have learned to expect from its publishers. It can be confidently recommended. H.M.T.

3399. JAEGER, E. C.
A source book of biological names and terms.
C. C. Thomas, Springfield, Illinois, and Blackwell Scientific Publications, Oxford, England, 2nd edit., 1950, 10×6½ in., pp. xxv+287, illus., 32s. 6d.
This fascinating book, first published in 1944 and now revised and enlarged, will prove an excellent one-way guide to the curious minded. One-way, because, although the enquirer will find it immensely useful in determining the probable meaning of a plant name, it will not help him much in bestowing erudite new names unless he already knows Latin and Greek or has a gradus handy. The author deals briefly but usefully with the method of word building, types of names, i.e. specific names, which are generally from the Latin, technical terms from Greek and Latin and generic names which are generally derived from the Greek, the application of names, transliteration, Greek prefixes and how they become changed, and the forms of Latin adjectives. He shows how a derivative name expressing a single feature may be permissibly built up in many different ways from the same origins, a fact which accounts for many anomalies in spelling. Further he discusses the application of names under the following headings: classical, native, geographical, personal, geological, descriptive, miscellaneous (habits, habitat, etc.), names indicating relationship, fanciful names, and finally names founded on error. The names—or rather words—themselves and their derivation and meaning are clearly set out and the few illustrations serve to relieve the print. A most desirable book for the biological library. D.A.

3400. KING, E. J.
The propagation of plants.
Hutchinson's Scientific and Technical Publications, London, 1950, 9×5½ in., pp. 264, illus., price 16s.
With the intention of providing a working manual for amateurs and students the author sets out to cover both the seedling and vegetative field. Seed collection, storing and sowing, in the open and under glass, the life-cycle of plants, elementary principles of breeding, hardiness and the formation of giant forms are all discussed. Vegetative propagation, including both natural and artificial grafting and the occurrence of "sports" and chimaeras, receives considerable attention and there are chapters on tree training, degeneration and the propagation of ferns. Six lists of plants grown from seed are given, including one of vegetables with their sowing and harvesting dates, and three lists of vegetatively propagated plants with notes on appropriate methods, and these will certainly prove helpful, though a few of the recommendations are optimistic and others somewhat inadequate. There is a useful glossary, and a carefully constructed index. It is extremely difficult to provide for both amateurs and students of science, and Mr. King has not altogether succeeded. Amateurs, many of whom are also beginners, must have crystal clear directions; pictures can, and should, be used generously, and Mr. King's thirty-five excellent line drawings are most helpful in this respect. But students should be given at least a few selected references to original work, if only to encourage their pursuit of knowledge; yet, except for a couple of minor references hidden in the text, Mr. King gives none. R.J.G.

3401. KLOSE, N.
America's crop heritage.
Iowa State College Press, Ames, 1950, 9×6½in., pp. 156, illus., $3.50.
This survey of plant introductions into the United States shows clearly the very important part played by such men as Fairchild, Lathrop, Hansen, Carleton, Knapp and the earlier statesmen of the U.S. in increasing the agricultural wealth of the Western Hemisphere by introductions from Europe, in particular, but also from Asia and elsewhere. It is certainly news to some of us to read of the very serious attempt to found a tea industry in Southern California in the middle of the nineteenth century, which ended with the closing down of the Experimental Tea Farm in 1887, but not before hundreds of households had learned to grow their own tea. [Do they still do so?] Similarly coffee was tried but proved even less successful in Florida, California and Texas. Olives show quite a different picture since the time when the Franciscans set out groves in California three centuries ago. The Deglet Noor date introduced by W. T. Swingle from Algeria in 1900 is now the basic variety of the present date industry in the United States. The tale of the introduction of the Smyrna fig and eventually the establishment of the wasp *Blastophaga psenes*, so essential to its commercial success, makes good reading. Galloway's estimate in 1928 gives a rough idea of the importance of fruit introductions. According to this the number of fruit crop varieties introduced and inventoried by the Office of Seed and Plant Introduction up to that date were: apples 600, avocadoes 353, blackberries 100, jujubes 225, mangoes 498, nectarines 50, peaches 500, pears 700, oriental persimmons 600 and plums 450. Other introductions included vegetables, sugar cane, tobacco and various cereals. Regional activities are now centralized round 4 primary introduction stations at Pullman, Wash., for the West; Ames, Ia, for the North Central Region; Glenn Dale, Md, for the North-East; and Experiment, Ga, for the South. The process of seeking, finding and improving continues, and between 1946 and 1948 five exploring expeditions left the U.S. in search of potatoes in Mexico, forage plants and groundnuts in S. America, and vegetables, oil plants, etc., in Turkey. In 1949 India was being searched for winter fodder cereals and other plants with potential industrial uses. Redesigning plants to contain special characters is the plant breeder's task and introductions are his raw materials. D.A.

3402. VON LOESECKE, H. W.
Bananas.
Interscience Publishers Ltd., New York and London, 1949, 8½ × 5½ in., pp. 189, price 36s.

This is Volume I of " Economic Crops ", a new series of monographs on the chemistry, physiology and technology of food and food products. That fact helps to explain the book's peculiar scope, which is not indicated by its over-simplified title.

The longest chapter (a quarter of the whole text) is devoted to chemical changes during ripening, which are evidently in the author's own field of research, and the next longest deals with commercial storage and ripening methods. These chapters, with shorter ones on transportation, banana products and nutritive value, and statistical tables of world production and trade, will be useful to some readers. They are not easy reading, because the author's method is to pick salient points out of every publication he can find, without expressing any critical conclusions. The effect is that of a string of abstracts, serving to guide the interested specialist to original sources—the unquestionably useful feature of the book is the bibliography of 488 references presented in footnotes—but leaving the non-specialist baffled and confused, with no clear picture of the present state of knowledge in the field covered.

The sections touching briefly on the origins of the banana plant, and its structure, development, cultivation, diseases and pests contain some thoroughly bad features and draw a picture so out of perspective as to be positively misleading in certain particulars. This applies particularly to the first six pages, where genetical and taxonomical conclusions drawn from a quarter of a century of banana breeding in Trinidad and Jamaica have been completely ignored. In the chapter on diseases, " bunchy-top " would appear, from the amount of space devoted to it, to be a minor affliction; and bacterial wilt, though mentioned under Panama disease, is not further dealt with at all. Wardlaw is freely cited, sometimes inaccurately, but his masterly textbook of 1935 is omitted from the bibliography. There are numerous minor errors that should have been corrected in proof. E.E.C.

3403. NEWSHAM, J. C. (revised by W. E. Shewell-Cooper).
The horticultural notebook.
The Technical Press, London, 4th edit., 1950, 6¾ × 4½ in., pp. 418, 10s. 6d.

This is a most disappointing book to review, for it teems with inaccuracies ancient and modern and is sadly out of date in much of its information. The best one can say is that it will probably be welcomed by and even be helpful to many, since it contains a useful collection of the facts and figures used in the everyday running of a garden, a nursery or a fruit farm. H.W.M.

3404. MACSELF, A. J. (SANDERS, T. W.).
Sanders' Encyclopaedia of gardening.
Collingridge, London, 1949, 8½ × 6 in., pp. 477, illus., 15s.

Sanders' Encyclopaedia, it is safe to say, was out in the world and earning its living before the majority of our readers were even contemplated. It has reproduced itself with the indefatigability of a greenfly ever since, and after countless editions and reprintings, which two major and several minor wars had apparently no power to check, it is here again, certainly bigger, and presumably better than ever, this time in the form of a " de luxe illustrated edition " at a price which contains its original modest charge several times over. Of its value there can be no doubt. The plants that receive mention must run into thousands, and though some of the latest arrivals on the horticultural scene have escaped notice they are few. Plants are arranged alphabetically by genera and by their popular names if they possess them. Within the genera are lists of the species most frequent in cultivation, with notes on their cultural requirements, special emphasis being on methods of propagation. The horticultural information, however, is not so encyclopaedic as the title might be held to infer. Methods of performing gardening operations are not described nor, for instance, will lists of apples or other fruits be found. On the other hand there are full instructions for cultivating these fruits, delivered in the concise telegraphic style which is one of the book's attractions. In short, we are told what to do but not how to do it. An innovation is the provision of an " alphabetical portrait gallery " of 500 plants, arranged 9 to a page. As in the past, this book will continue to prove a trusty friend. G.St.C.F.

3405. PARK, B.
Roses.
Sir Isaac Pitman & Sons, London, 1949, 7 × 5 in., pp. 141, illus., 10s. 6d.

Mr. Bertram Park, well known as an active member of Council of the National Rose Society and a highly successful exhibitor and amateur grower, has produced this book, expressly, he says, to help the inexperienced enthusiast. It should certainly do so. All that appertains to rose growing, including preparation of the soil, propagation, pruning, pests, diseases, and exhibiting, is discussed in meticulous detail and in the light of the author's own experience. No recommendation is made not based on personal tests. Roses were blooming, if not in Picardy certainly in America, 35 million years ago, unmindful that future man, still swinging in the tree tops or probably not yet having got so far, would one day work such vast changes in their features. Seeing that the evolution of the rose from that remote period to the present day is dealt with in 12 pages, it must thus be admitted that the first 34,999,800 years are only somewhat lightly touched upon. In compensation the progress of the last 200 years is worked out thoroughly and all the many garden groups of to-day are traced back to their origins. It is surprising to learn that 40 years ago no full yellow or orange-yellow garden rose existed. In the course of the book the author explodes what he calls " some irritating fallacies ". He states firmly, for instance, that roses do *not* like clay, that the older roses are *not* the best, that it is *not* necessary when planting to dig deeply and deposit a thick layer of expensive stable manure where the roots will not reach it till years after its nutrient value has vanished. In fact, newly planted roses should not be manured at all. New roses planted in old-established rose beds will certainly die. Muriate of potash is fatal to roses. Altogether the pages of this book, though disappointingly few, are packed with worth-while knowledge and

it is surely not only the inexperienced who should profit. Most of the excellent photographs were taken by the author. G.St.C.F.

3406. PROCKTER, N. J.
Simple propagation.
Collingridge Ltd., London and N. York, 1950, 7×5 in., pp. 144, illus., 6s.

This handy little book aims at satisfying the needs of the keen gardener who is imbued with the desire to multiply his beloved plants and so have the rewarding satisfaction of an amateur creator. Written in simple language and illustrated with a hundred photographs and drawings it certainly achieves its target. All one can fairly ask of a book on craftsmanship is here. The author is clear and concise, repeats himself infrequently and then with good reason, labels all pitfalls well and truly and is not querulous save for a sentence or two in the preface directed to the professional. The book is uncommonly free from errors, and though strongly bound for garden use is yet conveniently small for stuffing into the pocket in the morning rush to the office. Propagation by seed, division, layers, cuttings and grafting is adequately covered in a hundred pages, and forty more are occupied by special comment on the two hundred and fifty or so plants most likely to interest the amateur. R.J.G.

3407. SANKEWITSCH, E.
Die Arbeitsmethoden der Mitschurinschen Pflanzenzüchtung. Eine kritische Darstellung der Methoden und Anschauungen von I. W. Mitschurin und T. D. Lyssenko. **(Mičurin's methods of plant breeding. A critical presentation of the methods and views of I. W. Mičurin and T. D. Lysenko.)**
Eugen Ulmer, Stuttgart (at present Ludwigsburg), 1950, 9×6 in., pp. 172, bibl. 155.

In view of the several translations and critical discussions of Mičurin's and Lysenko's writings now available to English readers it is not proposed to review this new German book in any detail. Its distinguishing feature is that the author is a Russian plant breeder, who now lives in the "West" but was in close contact with Lysenko's work from 1930 to 1943. In stressing methods rather than results and their theoretical implications, Sankewitsch aims at assisting Western scientists to test the experimental technique used in the Soviet Union.

In his final critical remarks the author makes the point that the orthodox Mendelian theory of genetics is not entirely empirical but more or less unconsciously based on the "corpuscular philosophy" which in its turn is influenced by an out-dated conception of the atom. Hence it is likely that the recent revolutions in physics will eventually lead to a drastic revision of our ideas on the gene. The followers of Mičurin, on the other hand, may be breaking new ground in spite of the anything but firm theoretical superstructure they are erecting to explain their actual experimental achievements. After all—the author observes—Columbus discovered America while he was under the illusion that he had reached India.

The book is in three parts which deal with: (A) the phase theory, (B) directed heredity, and (C) the Soviet theory of genetics. Two appendixes give instructions on the vernalization of various crops. A preface by Professor Dr. W. Ludwig, Director of the Zoological Institute of Heidelberg University, introduces the author and gives his work, as it were, official academic backing. [For a more technical review, see *Plant Breed. Abstr.*, 1950, Vol. 20, No. 2, p. 363.] V.H.G.

3408. THORNE, D. W., AND PETERSON, H. B.
Irrigated soils.
Blakiston Co., Philadelphia and Toronto, 1949, 10×7½ in., pp. 288, illus., bibls. numerous, $5.00.

This well printed and excellently illustrated book will be very welcome to the agriculturist as emphasizing the soil management rather than the engineering side of irrigation. The stress is indeed on basic principles, but their application to particular crops and problems is also discussed. It is assumed that the reader has an elementary knowledge of the sciences that concern agriculture and that he is familiar with such concepts as pH, base exchange and the physical properties of soil. Even so, many an agriculturist not so amply equipped could read the book with profit. Irrigation work discussed includes not only American practice but also that in different parts of the British Commonwealth.

There are twenty-five chapters. In the first five the basic problem of the necessity for irrigation, soil water and plant relations, and plant relations to saline and alkali soils are discussed. Chapter 6 deals with the evaluation of land for irrigation. In Chapters 7-9 problems of the water itself, e.g. quality, amounts and measurement thereof, and finally field application afford the theme. In Chapter 10 irrigation practice for particular crops, including potatoes, is dealt with. Following this, the authors consider the possible effects of irrigation on soil characteristics including the deposition of soluble materials, biological and structural changes, etc. Drainage necessitated by irrigation next receives attention. In Chapters 13 to 16 the following all-important problems are considered: reclamation of saline soils, control of the soil physical and biological properties and the maintenance of organic matter. The principles enunciated for building and maintaining organic matter by proper use of green manuring, farmyard manuring and the use of artificial manure and composts are particularly interesting. Next, in Chapters 17-22, mineral nutrition is considered with particular reference to N, P and K supplies, a short chapter being devoted to the use of mixed fertilizers, and a summarizing one to the selection and application of mineral fertilizers, with notes on distribution in the irrigation water. The fruitgrower will be grateful for Chapter 23 on soil management in the orchard, based mainly on western U.S. experience. Iron, manganese, copper and zinc deficiencies and their remedies are all discussed. Special problems in vegetable crop production are more briefly discussed, tabular data being included which show some remarkable increases resulting from irrigation of onions, sweet corn, cucumbers, peppers, and other vegetables in Californian trials. The last 26 pages comprise a glossary of simple and not so simple terms used in irrigation practice, an appendix giving notes on chemicals and their solubility in water, formulae and factors for converting to metric measures,

and other data useful to those contemplating irrigation, an author index to the ample references given at the end of each chapter, and finally a subject index.

D.A.

3409. WOODCOCK, H. B. D., AND STEARN, W. T.
Lilies of the world.
Country Life, London, 1950, 9½×6½ in., pp. 431, plts., bibl., 35s.

Lilies of the World is a valuable addition to botanical and horticultural literature. There have been other books on lilies, from sumptuous folios to unpretentious handbooks, but in none has the family received such exhaustive treatment as in the present volume. Whether considered as a guide to the cultivation of lilies, their hybrids and variants or as a work of botanical reference in which all the known species are fully described and given adequate comment, *Lilies of the World* must be recognized as a work of exceptional merit. For the book has fully lived up to the ambitions of its title and can have omitted reference to no lily, whether true species or of garden origin of which there is any reliable record. The majority of these will have come under the personal cognizance of the authors whose knowledge of the family is profound. The first part of the book deals with the horticultural aspect and is at pains to dispel the illusion that lilies are any more difficult than most other garden plants. It is asserted that while no one but a supreme optimist would hope to grow all lilies successfully, there are very few gardens in which at least a few species will not thrive. To assist the faint-hearted lists of lilies for different soils are given and a list of lilies that are known to be " easy ". There is also a challenging list of beauties liable to display temperament if they cannot have everything they want. In general, matters of cultivation are fully discussed and the advice given does not seem too difficult to follow. The chapter on propagation is full of useful information, for lilies have more ways of reproduction than any other plant, and how to use these to best advantage is well described. In Part 2, classification and distribution are given full notice. The arrangement is alphabetical for easy reference and this plan is followed for the numerous fine plates in which nearly every species is portrayed. The genera *Cardiocrinum, Korolkowia* and *Notholirion*, which have been included in *Lilium* by many botanists, are given a special chapter. The book is well documented with a bibliography running into 12 pages and numerous references in the text. It has only been possible to give a brief indication of the varied contents of this book, but it can be confidently promised that where lilies are in question it will be found to have all the answers.

G.St.C.F.

3410. CAMPDEN.
Annual Report of the Fruit and Vegetable Preservation Research Station, Campden, 1949, 1950, pp. 19.

This year the scientific articles have for the first time been omitted from the annual report, which now consists only of a summary of the Station's advisory and research activities during the year, together with the results of a few of the more important experiments. The results of variety trials for canning and quick freezing are of horticultural interest. *Canning trials:* The strawberry Auchincruive Climax gave outstandingly good results. The best of the new Cambridge strawberry varieties were Nos. C 34, 643, 365 and 456, the last having given consistently good results during the past 4 years. Malling J was the best of the Malling raspberry varieties tested, while Malling Promise was of only moderate quality and Malling Landmark poor. Sharpe's No. 99 Canner and Lincoln came top of the green pea varieties. Of the stringless beans, Saxa, Konserva, Hinrich's Giant and Tendergreen were all satisfactory, and of the runner beans, Blue Lake and Phenomene were good. *Quick freezing trials:* Auchincruive Climax was the best strawberry variety tested. C 34 was almost as good, but there has been little consistency in the results obtained with the Cambridge varieties over the past 3 years and none can yet be confidently recommended for quick freezing. Among the vegetables, some of the best results were given by Meteor and Exquisite peas, Saxa and Konserva stringless beans, and Phenomene runner bean.

3411. CHESHUNT.
Thirty-fifth Annual Report of the Cheshunt Experimental and Research Station 1949, 1950, pp. 80, bibls. in text, illus.

Tomatoes: Following the successful use of alginic acid and alginates as a source of organic carbon in propagating soils, trials were carried out on glasshouse soils; sodium alginate at 1 oz. per square yard produced slightly higher, and calcium alginate slightly lower, yields than horse manure, while milled seaweed gave lower yields than did horse manure and no horse manure. In continued deficiency experiments, omission of N and K reduced yields considerably and increased the amount of blotchy ripening, but omission of P still had little or no effect; the continued application of leather waste at about 57 tons per acre has gradually increased yields. Top dressing and spraying treatments to correct Mg deficiency gave doubtful results. In a variety trial producing yields up to 89 tons per acre, the leading varieties were Corleys, Downes Seedling, Auchincruive 1A, Bruinsma and Auchincruive 5A. *Cucumbers:* The provision of a core of gravel or washed clinkers for drainage improved yields. Composted straw proved as satisfactory as horse manure. *Mushrooms:* The addition of cotton seed meal to horse manure during the third turn in composting proved too late to improve the compost. The addition of several minor elements to the casing soil had no effect, but there were indications that the crop was improved by addition of sodium alginate and alginic acid. *Carnations:* Experiments started in 1947 were continued, but owing to various setbacks results obtained so far are considered unreliable. *Plant diseases:* In continued investigations on *Didymella lycopersici* several factors that might influence the growth of the fungus in the soil were studied, namely soil moisture, organic matter, competition of other organisms in unsterilized soil and the addition of tomato juice, wheat straw extracts and vitamins. Among 4 American varieties said to be resistant to *Verticillium* wilt only Essar remained completely healthy. Studies on organisms causing brown root rot in tomatoes are reported. In virus studies tobacco in various forms was examined as a source of infection in tomato crops; spraying with 1% tannic acid once a week considerably delayed the spread of aucuba mosaic

between tomato plants by contact; an anti-virus paste proved a suitable substance for treating hands and knives during trimming; treatment of virus-infected tomato seed with 400,000 röntgens of X-rays had no inactivating effect on the virus content. A progress report is given on investigations into microbial antagonism and antibiotic substances. *Pests:* Detailed studies are reported on the life history and control of the tomato leaf-miner, *Liriomyza solani* Hering. Insecticide investigations were largely concerned with the control of red spider; on carnations the systemic insecticide bis-(bis-dimethylamino) phosphonous anhydride proved very promising against aphids and red spider. *Chemical problems:* Studies are reported on nitrification and steam sterilization. In sand culture experiments with 7 varieties of chrysanthemum, the symptoms resulting from omission of N, P, K, Ca, Mg, B, and Mn were determined and are described. *Growers notes:* Popular accounts are given of the tomato leaf-miner and its control, and of new insecticides for the control of carnation pests, namely azobenzene, HETP, TEPP, DDT, BHC, parathion and systemic insecticides.

3412. Costa Rica.
Informe de dieciséis meses de labor del Ministerio de Agricultura e Industrias del Gobierno de la Junta Fundadora de la Segunda República. **(Report on 16 months' work of the Ministry of Agriculture and Industries of the Second Republic [of Costa Rica])**, 1949, pp. 488, illus.

The reports of the various departments of the Ministry deal with their present and future programmes for the improvement of the agriculture and industries of the country. The experimental projects of the Agronomy Section include experiments on the control of *Cyperus rotundus* by 2,4-D, the control of black leaf spot of sisal hemp, the manuring of sisal hemp, and the improvement of kidney bean varieties by selection. Few conclusive results have yet been obtained. A method of terrace planting of coffee that has been tried out in several plantations to prevent soil erosion is described.

3413. East Africa High Commission.
Annual Report of the East African Agriculture and Forestry Research Organisation for 1948, 1949, pp. 37, price 2sh. 50.

This is the first annual report of the Organization which was established in February 1948 and incorporated the East African Agricultural Research Institute, Amani. The Director reviews the objects of the new Organization and outlines work in progress during 1948, amongst which may be noted investigations on the "sudden death" disease of cloves, the physiology of cloves and possible rootstocks, botanical classification of new material, a survey of sisal diseases, extensive fertilizer trials with associated microplots, mainly on field crops but including sweet potatoes, and studies on soils and on climatic data in relation to agriculture.

3414. East Malling.
Annual Report of East Malling Research Station 1949, 1950, A33, 187 pp., illus., 10s.

As in other years this report is in four parts: I. The experimental farm, with notes on yields from the various plots. II. General review of research work with lists of papers published during the year. III. Research reports and reviews. IV. Bulletins for fruit-growers. The present report covers the period 1 January to 30 September, 1949, and future reports will cover the financial and academic year from 1 October to 30 September. [For papers in III and IV, see separate abstracts.]

3415. The Edinburgh and East of Scotland College of Agriculture.
Reports on the Work of the College for the years ending 30th September 1948, pp. 103, and *1949,* pp. 102.

These reports are mainly concerned with educational and advisory work, though a few experiments are mentioned. *Horticulture.* In the North Area experiments were started in 1948 in 3 commercial plantations to ascertain the reaction of the raspberry to different dressings of nitrogen (organic and inorganic) and potash. Black root rot of chrysanthemums (*Thielaviopsis basicola*) and rust on red currants (*Puccinia ribis*), two rare diseases, have been diagnosed and control measures are recommended. Experiments on D-D treatment of soil against potato root eelworm gave negative results in 1948. Green manuring was tried the following year to increase the population of Enchytraeid worms and to determine whether they exercise any control on the eelworm.

3416. Forestry Commission.
Report on Forest Research for the year ending March 1949, 1950, pp. 80, H.M. Stationery Office, 1s. 9d.

The report covers work undertaken at the Universities as well as by Forestry Commission Staff. Abstracts 2289 and 2707 cover points of interest to horticulturists.

3417. Georgia.
61st Annual Report of the Georgia Experiment Station, 1948-49, pp. 79, illus.

Work in progress on horticultural crops includes: *Pecans:* Good control of the pecan weevil was obtained with two applications of 6 lb. 50% wettable DDT per 100 gal. *Peaches:* For control of plum curculio Julius Hyman compound 118, parathion and chlordan were most effective; lead arsenate was ineffective and BHC imparted an off-flavour when used after calyx fall. *Grapes:* In Muscadine grapes, summer plus winter pruning was compared with winter pruning alone. Summer pruning consisted of removing, several times during the growing season, all new shoot growth not needed in forming the framework of the plant and in pinching or cutting back spurs to 3 to 5 nodes. At the end of the third season summer pruned plants had formed 484 spurs and yielded 20 lb. fruit per plant compared with 219 spurs and 13 lb. fruit for plants pruned in winter only. *Dewberries, blackberries, raspberries:* In variety trials, types that have so far yielded best are named. *Vegetable variety trials:* Trials are reported with lima beans, snap beans, sweet corn and tomatoes. *Vegetable breeding:* Work is in progress on cantaloupes, watermelons and pimiento with special reference to disease resistance. *Vegetable pests:* Studies are in progress on the control of pickleworm on cucurbits, weevil on crucifers and cowpea curculio. *Wild garlic control:* At a minimum of about 3 lb.

2,4-D per acre, the amine or ester forms at 0·3 to 0·4% acid applied 2 years in succession between late January and early March gave almost complete control in pastures. *Georgia Mountain Experiment Station, Blairsville:* Results of variety trials are reported for grapes, strawberries and a number of vegetables.

3418. Horticultural Education Association.
H.E.A. Annual Report 1949, 1950, pp. 157, obtainable from Editor, H.E.A., "Tillings", Shamley Green, Nr. Guildford, Surrey, England, 2s. 3d.

The chief importance of this report to the outsider lies in the memoranda by H.E.A. Committees, the first on horticultural education at horticultural and agricultural institutes and the second by the Glasshouse and Flowers Committee on demonstrations on flower crops, and in the various papers presented at the Conference held at Reading in September 1949 on "Modern Education Methods in Horticulture". Subjects there discussed included the following: The place of horticulture in schools and the nature of horticultural teaching there; horticultural education in the farm institute; the objective of horticultural education in the University, methods of instructing the horticultural student and post-graduate training in horticulture; and finally the methods whereby knowledge of horticultural research is made available to the advisory officer and the general public. Experts from the Ministry, Reading University, the Midland School of Agriculture and Wye presented papers, and the liaison services and functions of the Commonwealth Bureau of Horticulture and Plantation Crops are set out in some detail.

3419. I.R.S.I.A. Belgium.
Rapport Annuel de l'Institut pour l'Encouragement de la Recherche scientifique dans l'Industrie et l'Agriculture, Exercice 1949. **(Annual Report of the Institute for the Encouragement of Scientific Research in Industry and Agriculture, 1949)**, pp. 163.

An administrative report containing information on the many research programmes subsidized by the Institute.

3420. Indian Council of Agricultural Research.
Annual Report of the Indian Council of Agricultural Research for 1948-49, Delhi, 1950, pp. 79, Rs. 1 or 1s. 6d.

Brief mention is included of the following horticultural crops (pp. 13-20): *Cloves:* Experiments on young trees in Travancore have shown shade to be necessary, seed viability to be very low, and germination to be reduced if seeds are planted deeper than 1 in. *Turmeric:* Variety trials and processing methods. *Cardamoms:* Selections for yield and quality, control of thrips by nicotine and gammexane, and control of nursery diseases by shading and spraying with colloidal copper or bordeaux. *Coriander:* Studies on wilt disease (*Fusarium oxysporum*). *Milk-yielding trees:* The introduction of trees [species not stated] producing edible milk has been sanctioned. *Fruits:* Work is in progress on many fruits including classification, selection and diseases of mangoes, classification, propagation and cultivation of citrus, varieties of litchi, papaya, grapes, custard apples, and temperate fruits, apple rootstocks resistant to collar-rot and woolly aphis, banana breeding, and a survey of the soil and climatic conditions under which cashews can be grown. *Potatoes:* Studies are in progress on varieties and hybrids, selection and multiplication of disease-free plants and storage pests and diseases. *Fruit technology* (pp. 26-32): Investigations are in progress on products from the following fruits: mango, citrus, custard apple, sapodilla (chikoo), jaman (*Eugenia jambolana*), tamarind, sanghara (water chestnut) and deciduous fruits.

3421. Indian Tea Association.
Annual Report of the Indian Tea Association, Scientific Department, Tocklai, for 1948, 1950, pp. 31.

Manurial experiments: In a time-of-manuring trial 80 lb. N applied on 1 August gave a significant yield increase in the same year, whereas a similar application on 1 September did not. In a manurial trial on tea under shade, results for the last three years are tabulated, which show that, whereas 15 lb. P_2O_5 increased yields over nil, 30 lb. and 60 lb. gave no increases or even reduced yield; K_2O had no effect on yield. *Plucking experiment:* In an experiment started in 1935 with 7 treatments, the higher the plucking level the greater has been the thickness of branches and the less their number in the frame of the bush. Leaving a leaf in the second flush, which is tantamount to increasing plucking height, increased the thickness and reduced the number of branches. Plucking at 8 in. to the *janam* gives the best long-term crop yield with *assamica* type tea. *Vegetative propagation:* It has been found beneficial to expose cuttings to full sunlight after they have rooted but before they begin to shoot. *Mechanism of fermentation:* The view of Ceylon workers is confirmed that tea-oxidase is a copper-protein and that tea-leaf contains no cytochrome oxidase. Studies suggest that the greater part of the tea-oxidase is localized in the chloroplasts, whereas the catechins have been shown to be localized in the vacuole. Studies are also reported on oxidase assay and diffusion effects and on the origin of CO_2 in fermentation. *Chemical composition of tea-leaf:* A new method has been worked out for estimating the lipides in tea-leaf. Studies on the catechins by filter paper partition chromatography indicate that, although there may be as many as 8 individual catechins, there is little difference in their relative proportions in different types of tea. It has been established that the principal amino-acids in tea are aspartic and glutamic acids and a peptide of glutamic acid, other amino-acids, including alanine, occurring in smaller quantities. The relative abundance of these substances varied little from one type to another. The problem of obtaining amino-acids free from catechins remains unsolved. *Manufacture:* Experiments relating quality to chemical composition are reported briefly. *Pest control:* Sprays containing 1 lb. 50% wettable DDT powder to 40-50 gal. controlled looper caterpillar, mound-building termite, crickets, nettle grubs, medeloa beetle and thrips, but was not effective against red spider or the tea seed bug, *Paeciliocorus latus.* BHC tainted tea, but a non-tainting formulation is to be tried. Studies on red spider control are reported. *Diseases:* A new disease, referred to as *Sclerotinia* disease, which attacks tea flowers and fruits, is described. Experiments on

its control are under way, as is work on blister blight. *Observations on estates:* It has been noted that raising the plucking level from 6 in. to 8 in. on weak or over-plucked sections has resulted in a considerable improvement with no ultimate loss of crop. The advantages of hedge planting are summarized. The shade tree, *Albizzia moluccana*, has been seen to have an adverse effect on bearing tea, because of too dense shade and root competition.

3422. John Innes.
Fortieth Annual Report of John Innes Horticultural Institution, March 1950, pp. 29, 3s.

The final move of the Institution from Merton to Bayfordbury took place between 22 August and 18 October, 1949. Research work was necessarily somewhat disturbed, but the report nevertheless remains, as always, full of horticultural interest. A note is given of the establishment of the Rose Collection begun in 1948. Cuttings of some 400 roses were successfully rooted and survived removal and summer drought. The Pomology Department reports *inter alia* work on raspberry-blackberry hybrids, on the cause of bolting in potatoes, the genetic basis of pathogenicity in *Venturia pyrina* concurrently with that of resistance in the pear host, incompatibility or breeding in cherries, haricot beans and tomatoes. The Genetics Department is continuing its studies on isolation and contamination in seed crops. A variable which affects crossing is found to be discrimination in bees. Considerable work concerned with flowering bulbs is reported by the Cytology Department. The Garden Department is investigating the artificial illumination of seedlings of tomato, lettuce and cucumber, the claims of certain proprietary organic fertilizers and, more lately, appropriate methods of cultivating succulents. Whereas at Merton the total area was 9·75 acres, top fruits alone cover more than that at Bayfordbury, where the total area is 90 acres.

3423. Knowles, W. H. C.
Report on the sugar experiment stations for the year 1949.
Sugar Bull. Brit. Guiana Dep. Agric. **18,** 1950, pp. 53-8.

This section forms the administrative report. For the report on experimental work, see abstract 3278.

3424. Long Ashton.
Annual Report of the Long Ashton Agricultural and Horticultural Research Station, 1949, 1950, pp. 174.

In pages 7-24 the director reviews activities of the station and summarizes the progress of research into plant nutrition, pomology, pest and disease control, cider and fruit juices and fruit and vegetable preservation. Individual reports on work completed or in progress are abstracted or noted separately in this number of *H.A.*

3425. Mississippi.
Highlights of the work of the Mississippi Experiment Station, being ***62nd Annual Report of the Mississippi Agricultural Experiment Station for 1948-49,*** pp. 66, illus.

Horticultural studies (pp. 27-9): (1) *Sweet potatoes:* Curing for 5 days at 85° F. and about 85% humidity gave protection against storage rots. Sixty-nine varieties and selections under trial showed great variations in yield, carotene and starch content and resistance to stem rot. (2) *Vegetables:* Breeding and variety trials are in progress with cucumbers, Irish potatoes, sweet corn, tomatoes and snap and lima beans. (3) *Ornamentals:* Variety collections have been established with particular reference to disease resistance and tests made with the newer fungicides on camellias, chrysanthemums, asters, roses and snapdragons. *Fruits:* Studies included fire blight resistance in pear varieties, suitability of peach varieties for quick freezing, breeding of apples, plums, strawberries and raspberries, grape pruning and a new peach fertilizer trial. *Coastal Plain Branch Station: Sugar cane varieties:* Of six varieties tested for juice quality the best were Co. 290, C.P. 26/181 and C.P. 36/76. *Sweet potatoes:* Responses to 4 types of N occurred in a fertilizer trial. *Delta Branch Exp. Station: Weed control:* The amine form of 2,4-D has been used at up to 2 lb. acid per acre in winter oats and wheat with good control of weeds such as vetches and docks. Tests with some 25 pre-emergence herbicides in cotton have given promising results. *Strawberries:* Preliminary trials with 2,4-D for weed control were promising, but further work is necessary. *Peaches:* Better growth and yields have been produced by cultivated trees than by trees in grass. *Other studies* were made on tomato staking *versus* no staking, lima bean and apple varieties, and methods of poisoning trees. *Truck Crops Branch Station:* Studies reported include breeding and variety trials with tomatoes, snap and lima beans, bell pepper, sweet corn and English peas, lime and boron studies on cabbage, cauliflower, beans, tomato and spinach, and comparisons of 3 different sources of N for tomatoes. Disease resistance and control studies have been made on tomatoes, sweet potatoes, peppers, eggplants and cabbage.

3426. National Institute of Agricultural Botany.
Thirtieth Report and Accounts 1948-49, N.I.A.B., Cambridge, 1950, pp. 39.

Notes on variety trials of field crops and of brussels sprouts, broccoli, early cauliflowers, onions and potatoes.

3427. Nebraska.
61st Annual Report of the Nebraska Agricultural Experiment Station for 1947, 1948, pp. 119, illus. [received 1950].

Weed control (pp. 28-30): Observations on farms showed 2,4-D to have eliminated cocklebur and sunflower, and to have reduced pigweed, velvetleaf and wild artichoke in maize fields with damage to the corn plants ranging from 0 to 10%. Pennsylvania smartweed was rather tolerant and foxtail and sandbur were relatively unaffected. In experiments with 3 types of 2,4-D at ½, 1 and 1½ lb. acid per 40 gal. water per acre, the two higher rates resulted in brittleness of the corn and many broken plants, and the ½ lb. application was considered sufficiently effective. *Horticultural Crops* (pp. 32-40): *Vegetables and root crops:* Studies are reported on the composition of different varieties of potatoes, sweet potatoes and tomatoes, variety trials with sweet potatoes and lima beans, tomato breeding

and potato storage, breeding, and cultural methods, including the successful use of the butyl ester of 2,4-D to control weeds. *Fruit:* The behaviour of new walnut varieties was studied. In trials with 2,4-D to delay blossoming, concentrations of 25 to 300 p.p.m. were applied lightly at 1 to 8½ gal. per tree in an attempt to prevent damage; apart from a slight and inconsistent postponement of full bloom in plums no visible delays were induced in several varieties of apple, cherry, apricot or peach. In blossom-thinning spraying tests with Duchess and Wealthy apples, using per 100 gal. ⅘ and 1⅕ qt. Elgetol, 1 lb. DN No. 1, and 6 and 8 oz. App-L-Set, all treatments reduced the number of fruits per bearing spur by an average of 9·7% for Duchess and 16·7% for Wealthy without damage to foliage; in Wealthy the sprays increased the percentage of large fruit but reduced the total yield. Experiments are reported on the control of apple scab, cedar-apple rust, apple blotch and cherry leaf-spot by Fermate and 341 " B " compared with standard fungicides. With Montmorency cherries spraying with Dowax 222 emulsion increased the weight of fruit by 7·8%. *Diseases and pests:* Of potatoes and their control. *Farm machinery:* A mechanical castor oil bean harvester has been developed and is illustrated.

3428. North Carolina.
Research and Farming, Vol. 7, No. 4, being *71st Annual Report N. Carolina Agricultural Experiment Station, 1948,* 1949, pp. 68, illus.

The following items are selected as of horticultural interest: *Tobacco:* Studies on varieties resistant to black shank disease and on tobacco hybrids; methyl bromide as a weedkiller in plant beds; manuring of seed beds; flea beetle control; investigations on the needs of tobacco for Ca and P, including the use of radioactive P; and the development of a new curing barn. *Field crops:* Good results with 2,4-D for weed control in maize; the use of dried sweet potatoes as cattle feed. *Vegetables:* The use of tribasic copper sulphate against tomato leaf diseases; vitamin A and C determinations in sweet potatoes and collards; internal cork in sweet potatoes; damage to snap beans from materials used to control nematodes and to other vegetables from Uramon; soil treatment to control rootknot nematode in cantaloupes; response of potatoes to P and various disease studies; anthracnose leaf spot on crucifers. *Bulbs:* Use of 2,4-D against weeds in gladiolus, daffodil and iris. *Small fruits:* Raspberry breeding; lack of response in strawberries to minor elements; control of strawberry weevil by DDT; strawberry and blueberry selections; grape breeding and injection to cure Mg deficiency. *Tree fruits:* Parathion and BHC to control plum curculio; DDT and parathion to control peach borers; promising results from a new North Africa rootstock [peach ?] for peaches.

3429. Nyasaland Protectorate.
Report of the Department of Agriculture Nyasaland for 1948, Part I, Zomba, 1949, pp. 19, 2s. 6d.

Details are tabulated of acreages, production, yields and exports of the various crops, amongst the more important of which were tobacco, tea and tung.

3430. Ontario Department of Agriculture [Vineland].
Report of the Horticultural Experiment Station [Vineland] for 1947 and 1948 [undated, received 1950], pp. 82, illus.

This biennial report makes no attempt to cover all the Station's activities. Some investigations (including the new 1947 and 1948 projects) are briefly noted; others are reported in some detail. The latter include: *Soil fertilization experiments with the Concord grape* [see abstract 2446]. *Some effects on the soil through shortening the annual cultivation period in an apple orchard.* A 20-year comparison between normal (to mid-July) and minimum cultivation (to mid-May) in an orchard on fine sandy loam shows that in addition to more economical yields of fruit, the soil under minimum cultivation has better structure, more replaceable potassium and probably more organic matter. *Soil erosion as a factor in tomato production.* The effect on yield of small gulley-erosions in a tomato field is being investigated. *The weather.* Accumulated weather records kept at the Station over the period 1916-48 are summarized, the data for the last 20 years being examined in some detail. *Fruit and vegetable breeding.* The work on grape and cherry breeding that has been carried out at the Station since 1913 and 1915 respectively is reviewed.

3431. Oregon.
Oregon's agricultural progress through research, being *Annual Report of the Oregon Agricultural Experiment Station for 1948-49* or *Stat. Bull.* 477, 1950, pp. 140, illus.

Reports of horticultural work include the following items: *Potatoes:* Studies of leaf roll and late breaking virus diseases. The variety Calrose was found to be highly resistant to late blight in all areas tested. Soil treatment with 5 lb. chlordan per acre gave 98% control of tuber flea-beetle. *Hops:* Results of a uniformity trial indicate that the use of small plots (1 × 5 hills) is effective in the conduct of experimental trials. Highest yields of the Fuggles variety were obtained by training 2 vines per string and 3 strings per hill; the greatest response to N- and P- containing fertilizers resulted from the application of 75 lb. N plus 75 lb. P_2O_5 per acre. Methods of inspection and grading are being studied in an attempt to establish a standardized system of hop quality evaluation. *Vegetable seed:* Best yields of cabbage seed were obtained by close spacing and high nitrogen levels. Yields from direct seeded crops and 45-day transplants were higher than those from 60-day transplants, but the latter had a higher survival rate. Highest yields of cucumber seed were obtained from the earliest plantings; nitrogen was the only fertilizer element that gave significant increases in green weight and seed yield. *Weed control:* IPC (O-iso-propyl-N-phenyl carbamate) applied in oil showed great promise for control of quack grass and grassy weeds; discing a week or 10 days after the application greatly increased its effectiveness. *Tree fruits:* Pears treated with Dowicide C in the fruit wash showed about 4% less total decay after storage than those receiving the normal washing treatment; the fungicide gave good control of grey mould rot, material reduction of canker rot and slight control

of blue mould decay. Experimental plantings have been made of the Oregon wild plum to determine the best type for hybridization, the most suitable rootstocks for orchard production and the pollination requirements of the species; the variety is hardy, prolific and a late bloomer, and is being increasingly planted in Oregon. Many aspects of the " little cherry " virus disease are being studied, including rates of spread, insect vectors, resistant varieties and the use of Mahaleb rootstock as a means of combating the disease. *Small fruits:* 17,537 strawberry crosses were tested for red stele resistance; the native wild strawberry, U.S.3374 and Oregon 1815 and 2012 were found to be good sources of resistance. Four per cent. lime-sulphur is recommended as the best spray for control of raspberry yellow rust; applications should be made just as the unfolding buds begin to show green. *Nuts:* Successful control measures for several filbert pests have been developed. *Vegetables:* Pest and disease control trials are reported. *Nursery:* The use of a paper mulch in rose stock nurseries has proved very beneficial in reducing weeds and promoting early spring growth for budding. A spray of Nacconol NR plus a summer oil emulsion has satisfactorily defoliated most varieties of hybrid tea roses in 10-14 days prior to digging and storage. Large-scale holly investigations are being carried out to determine the best cutting and pruning practice, the best varieties for commercial production and their pollination requirements. Rapid drying of gladiolus corms after harvesting greatly reduces botrytis rot. Orange tortrix, a pest of cane fruit, can be reliably controlled by 2 applications of 5% D_3 dust at 40 lb. per acre, or sprays of 1 lb. 50% wettable D_3 per 100 gal. water.

3432. PENNSYLVANIA.
Science for the farmer, being ***Suppl. No. 3 to the 62nd A.R. Pa agric. Exp. Stat. for the year ending 30th June 1949,*** 1950, pp. 11, illus.

This supplement includes (1) a discussion, illustrated by some results of recent trials, of the way in which cultural methods and especially spraying practices, designed to increase yields, may reduce the canning quality of cherries; (2) information on the selection of hardy and leafspot-resistant mazzard rootstocks in Pennsylvania; and (3) results of insecticide tests for the control of cabbage caterpillars, in which Dieldrin (497), DDT and TDE were found superior to 15 other compounds.

3433. TANGANYIKA.
14th Annual Report of the Coffee Research and Experimental Station, Lyamungu, Moshi, for 1947, 1950, pp. 38, 50 cents (6d.), being *Pamphl.* **47.**

Numerous experiments are reported, amongst them the following: *Method and depth of planting:* In each year, as well as over a 10-year bearing period, planting at nursery level, whether with a ball of earth or bare roots, has given better yields than deep planting. Results from time of holing out and placing compost are inconclusive, but the method of holing out 3 months, and filling in the holes 1 month, before planting, has proved sound and avoided sinking of plants. *Progeny trials:* Yields are tabulated for 6 and 7 years for seedlings from selected mother trees. *Seedlings versus clones from the same parent tree:* Yields are tabulated for 3 years in one of which the crop failed. Results so far favour clones, but it is considered too early to draw conclusions. *Mulch, compost and sulphate of ammonia:* In an experiment planted in 1940 all treatments were applied at 3 levels, viz. nil, single and double. Mulch, especially the lower level, has generally increased yields, as has compost, with little difference between the two rates of application. N has usually decreased the yield. *Three forms of N fertilizer at three rates and times of application:* In the one crop taken since treatments were first applied in 1946, neither type nor rate of N showed any effect; the 3 fertilizers behaved somewhat differently with regard to time of application. *Cultivation:* Over 10 years there has been no significant difference between hoe digging and no cultivation with the weeds brushed only. *Selection in nursery:* Over 10 years there have been no significant differences, but yields indicate that the selection of planting material with good tops and root systems is sound practice. *Multiple versus single stem pruning in arabica coffee:* Over 10 years multiple stem trees with 3 suckers have given 75% more crop and a significantly higher proportion of Grade A beans than single stem, at greatly reduced cost of pruning. *Types of mulch and compost plus N:* Over 6 years various treatments and interactions have been significant, but no long-term effect has been shown so far; differences in response to mulching between this and other experiments have not been explained. *Irrigation and mulching using four clones:* Irrigation and mulch applied at 4 levels over 6 years have shown significant responses, but little difference between the various levels. Various interactions were significant in different years but no long-term effect is evident. Control plants, however, show a regular biennial bearing cycle, quite different from the yearly behaviour of the irrigated and mulched trees. *Clonal selection trials:* Yields for two years are tabulated. Most have so far done very well, but it is too early for definite conclusions.

3434. UGANDA.
Annual Report of the Uganda Department of Agriculture for 1948, 1950, pp. 44, 3 shs.

Whereas previously this Annual Report has been published in two parts, administrative and experimental, it is now being published in one. Experimental work on such crops as cotton, coffee, and tobacco is mentioned only briefly, and full reports are to be published later in bulletin form. The present report should therefore be considered primarily of interest for its details on production, acreages, and crop values.

3435. U.P.A.S.I.
Annual Administration Report, United Planters' Association of Southern India, Tea Scientific Section, for 1948-49, 1949, pp. 32.

The principal experimental work described in this report is as follows: *Helopeltis:* In a series of trials on the control of *Helopeltis,* BHC as dust or spray proved inferior to DDT. Methods and timing of applications of DDT were examined and further studies are to be made. *Blister blight:* Spraying 12 times with Perenox against blister blight in a trial started in 1947 produced a 50% increase in yield as compared with the unsprayed control, but towards the end of the period

differences became slight. In a second trial Perenox at 2 oz. per 10 gal. proved as effective as 4 oz. per 10 gal. In a nursery plot, Perenox spray, giving 75% protection, proved more effective than Perelan dust. Comparing light, medium and hard plucking for a period of 9 months, hard plucking slightly reduced the incidence of blister blight, but also adversely affected yield. *Defoliation:* On the assumption that red spider or other mites may influence defoliation, spraying was carried out with lime-sulphur at two strengths, but no distinct improvement resulted. No evidence was found pointing to a pathogenic organism or virus. There was some indication from an NPK trial that less defoliation occurred in high K plots and that healthy plants had a higher K_2O content in mature leaves than defoliating plants. Further work is being done on this aspect and also on the effect of mulching and of adding water in the dry season. *Fertilizer trials:* In the eighth year of an NPK trial at the Experimental Station, N at 80 lb. per acre, but not at 40 lb., continued to give significant yield increases; 40 lb. K, but not 20 lb., gave a significant increase for the first time. Two other NPK trials, one N trial and one N and Ca trial showed no significant responses. A high range NPK trial repeated in four places showed some response in two places only. *Cultivation:* Differences between no cultivation, forking and trenching were not significant. *Pruning:* Very little difference has been shown in one experiment over a 3-year cycle between slope pruning and ordinary pruning. *Other work:* Reference is made to other diseases of tea and to diseases of shade trees, coffee, hevea rubber and cardamoms.

3436. Secretary of Agriculture, U.S.A.
Report of the Secretary of Agriculture, 1949, U.S. Govt Printing Office, Washington, 1950, pp. 136, 35 cents.

The report outlines production trends in agricultural produce of all types, farm prices and earnings, new legislation, economic studies, education, housing, conservation measures, major research developments, and various other aspects of agricultural development in the U.S.A.

3437. Agriculture Research Administration [U.S.A.].
Report of the Administrator of Agricultural Research 1949, U.S. Department of Agriculture, 1950, pp. 425, 75 cents.

Following a short introduction, which discusses the aims and progress of research, are extensive reports covering the whole field of agricultural research work from the heads of the various Bureaux. Abstracts 3438, 3439 and 3440 deal with three of them.

3438. Hilbert, G. E.
Report of the Chief of the Bureau of Agricultural and Industrial Chemistry.
Rep. Administ. agric. Res. U.S. Dep. Agric. 1949, 1950, pp. 11-98.

Amongst many research projects reported are the following: Problems arising from excessive trash and immature joints of stalk in mechanically harvested sugar cane ; commercial application of the froth-flotation process for cleaning vined green peas, and studies on the effects of bruising and delays on the flavour of frozen peas; the preservation of dried carrots by starch coating before dehydration; studies on *Rhus* spp., *Castanea ozarkensis, Quercus* spp. and pecan shells as potential sources of tannin; the production of tannin from canaigre roots, *Rumex hymenosepalus*; progress made on the extraction of rubber from guayule by milling freshly harvested shrubs and by deresination of the shrub; the determination of three forms of beta-carotene by a new method; the discovery and fractionation of probably eight antibiotics in sweet potato, cabbage and banana; the characterization of tomatine and tomatidine, the former being found to have growth-regulating activity; studies on lupulon and humulon of hops as antibiotics; studies on natural and synthetic plant-growth regulators, including the use of radioactivity to study distribution in plants, the separation and behaviour of allergenic proteins, the analysis of oilseed allergens for amino acids; the development of new instruments for measuring large molecules; the use of photochemical oxidation in protein and virus research; a new spectrophotometric assay-method for hop resin; and X-ray studies on the pectin molecule.

3439. Annand, P. N.
Report of the Chief of the Bureau of Entomology and Plant Quarantine.
Rep. Administ. agric. Res. U.S. Dep. Agric. 1949, 1950, pp. 229-95.

Amongst investigations affecting horticultural crops the following may be noted: *Vegetable insects:* The successful use of organic phosphorus compounds against greenhouse pests; the control of green peach aphid on tobacco with parathion; the effect of insecticides on the yield and quality of tobacco; the control of aphids on potatoes, peas and cruciferous crops, of melonworms and pickleworms on cucumbers and of the serpentine leaf miner on tomatoes, etc.; tests with insecticides against wireworms; the control of onion thrips; the campaign to eradicate the sweet potato weevil; studies on nematodes infesting potatoes. *Fruit and nut insects:* Four leafhoppers have been found capable of transmitting phony peach virus disease; new insecticides tested against pests of apples, pears, stone fruits, pecans, citrus, pineapples and grapes; the promising use of parathion against scale insects; the eradication of the Hall scale in California by fumigation; a great reduction in the population of Comstock mealybug on apples by DDT; sprays and parasites used against citrus blackfly in Mexico. *Control of plant diseases:* In the campaign to eradicate *Ribes* spp., the alternate hosts of the white-pine blister rust, effective use was made of sprays of 2,4-D and 2,4,5-T. For the eradication of barberry, the alternate host of stem rust of cereals, use has been made of 2,4-D and ammonium sulphamate.

3440. Salter, R. M.
Report of the Chief of the Bureau of Plant Industry, Soils and Agricultural Engineering.
Rep. Administ. agric. Res. U.S. Dep. Agric. 1949, 1950, pp. 313-410.

In a section devoted to investigations on crops and their management, mention is made of the following: *Sugar cane:* Increased yields and sugar contents resulted from aeroplane spraying of 2,4-D to control morning-glory, cypress-vine and button tie-vine; new sugar cane varieties have been released. *Tobacco:*

Soil fumigation experiments to control nematodes and root rot diseases have shown promise. *Rubber plants:* New developments in the double budding of hevea in Brazil and in hevea disease studies; yields obtained from interspecific hybrids of guayule. *Fruit crops:* Residual effects of 2,4-D on apples in Pennsylvania; apple responses to N fertilizers; studies on the reasons for increase in phony peach disease following application of N fertilizer; increased set of Anjou pears through spraying with boron; new tetraploid forms of peaches obtained by the use of colchicine; grape rootstocks in California; studies on virus infection in strawberries; resistance of citrus rootstocks to tristeza in Brazil; effect of phosphate fertilizers on oranges in Florida; new tung varieties; the use of liquid nitrogen on tung; the effective use of 2,4-D to kill pecan and chestnut stumps; the release of 3 new varieties of Chinese chestnut; the ratio of nutrients as affecting absorption by tung trees; resistance of tung trees to frost; the uptake of radioactive phosphorus by pecan trees; increases in filbert yields from N application. *Vegetables:* New varieties, breeding, etc., in beans, lettuce, tomato, onions and sweet potatoes; the maintenance of vitamin C in fresh vegetables; nematodes in mushrooms; colour and pungency factors in onion disease resistance; studies on hybrid potato selections apparently immune to late blight. *Ornamentals:* Stunt of chrysanthemums has been found to be due to a virus; improved tetraploid varieties of gardenia have been developed; the proper curing of Dutch iris bulbs has reduced " blindness " and hastened flowering; the response of gladiolus and poinsettia to photoperiods has been studied. *Growth substances:* Of 603 organic compounds tested, 116 gave varying plant responses. Experiments mentioned include the use of 2,4,5-T to hasten maturity of apples, of 2,4-D on bananas, and of several substances that prolong the flowering of the Oriental cherry. *Miscellaneous crops:* The successful cultivation of red squill in California for production of a rat poison; studies on diseases of digitalis and safflower. *Agricultural engineering:* Studies are reported on a specific gravity potato grader, a new electric plant for curing tobacco, a special machine for radioactive fertilizer research, new machines for fertilizer placement tests, the mechanical harvesting and drying of tung, the mechanized cultivation of sweet potatoes, the mechanical de-trashing of sugar cane.

3441. U.S. Department of Agriculture (Trullinger, R. W.).
Report on the Agricultural Experiment Stations 1949, 1950, pp. 158, 35 cents.

The period covered is the fiscal year ending 30 June, 1949. The report is a synopsis of the most important research projects or results throughout the Federal Stations, which are dealt with more fully in bulletins issued by the respective stations. *Marketing.* Studies on marketing and packing range from costs of packing fresh citrus fruits in Texas *via* prepackaging of lettuce in Indiana and of sweet corn in Florida to labour efficiency promotion in warehousing burley tobacco. *Fruit crops.* A new red apple, the Idajon, a cross between Jonathan and Wagener, ready to harvest 10 days before Jonathan, and suitable for early marketing and eating, is announced from Idaho. An excellent control of *Alternaria* rot of lemons by 2,4-D is reported from the California station. Washington reports a simple chemical test whereby certain fruit tree viruses can be readily and quickly detected. A disc is taken from the leaf with a paper punch. It is put in a test tube with a solution of sodium hydroxide, copper sulphate and sodium citrate. The tube is heated in a boiling water bath for 5-10 minutes, allowed to cool for 10 minutes and shaken. Normal leaves give a blue green, virused leaves a red colour. Brown rot in peaches is being studied seriously in Delaware and Illinois. In Rhode Island sawdust mulch proved highly successful for blueberries. At the Missouri Station work has resulted in the application of *p*-chlorophenoxyacetic acid to increase fruit set, size and yield of tomatoes. In Arkansas the Fortune tomato resulted from breeding work started in 1939. It is of good colour and size and is resistant to fusarium wilt. Connecticut work on chemotherapy of plant disease is beginning to yield results, in that three compounds developed by the station have been shown to prevent fusarium infection in tomato plants when given at levels that will not cause direct injury. Considerable work on insecticides is reported.

3442. U.S. Department of Agriculture.
Agricultural Statistics, 1949.
Superintendent of Documents, U.S. Govt Printing Office, Washington, D.C., 1950, pp. 787.

Data are tabulated for 1947 and 1948 and in many cases for the past ten or twenty years for acreages, yields, utilization and values of crops of all types. Figures for sugar include production in Cuba, Puerto Rico, Hawaii and the Philippines as well as summaries of world production. Similar summaries of world production are given for citrus and the major deciduous fruits.

3443. Wattle Research Institute.
Report for 1949 (2nd year) Wattle Research Institute.
Pietermaritzburg, 1950, pp. 43.

Two general papers concern the possibilities of co-ordinated wattle research in the African Region and of wattle cultivation in Tanganyika and Nyasaland.

3444. Wye College.
Report of the Department of Hop Research, Wye College, Kent, for 1949, 1950, pp. 54, 3s.

As in 1948 [*H.A.*, 19: 2637] the report is in two sections. The general report outlines the work of the year with reference to manurial experiments, hop varieties (selection, breeding, genetics, cytology), verticillium wilt, processing hops, advisory work. The second section comprises articles by members of the staff on special subjects, i.e. hop manuring, magnesium deficiency, effect of soil acidity, cytology. [See abstracts Nos. 2983-2985.]

3445. Zürich-Oerlikon.
Bericht über die Tätigkeit der eidg.Landwirtschaftlichen Versuchsanstalt Zürich-Oerlikon pro 1948/49. **(Report of the Zürich-Oerlikon Agricultural Research Station for 1948/49.)**
Landw. Jb. Schweiz, 1950, **64**: 373-444.

Vegetables and potatoes were included in the seed materials tested. Of the numerous measures examined to improve seed potatoes, premature harvest was found one of the most effective for the control of virus diseases. In Colorado beetle control 50% DDT and 50% methoxychlor suspension in 0·2 and 0·25% concentration respectively gave the most satisfactory results.

New periodicals.

3446. ANNUAL REVIEWS INC.
Annual Review of Plant Physiology 1950. Stanford, Calif., H. K. Lewis, London, 9×6 in., Vol. I, pp. 364, $6+postage, U.S.A. and Pan American 15 cents, Foreign 35 cents.

This takes its place beside the *Annual Review of Biochemistry* published by the same body and will be welcomed by all plant biologists who are trying to keep abreast of modern developments in physiology.

The editors announce their intention of pursuing " the policy . . . of stressing critical evaluation of published results of research rather than striving for encyclopedic completeness ". Special consideration is promised for " subjects bordering on several disciplines, such as soil and plant interrelations, physiological anatomy and physiological ecology and to the examination of the application of physiological principles to horticulture, agronomy or forestry ". The first number, which is fully indexed, contains 15 articles ranging from the purely physiological, such as Water relations of plant cells and tissues, to Herbicides. [Articles such as these on matters of fundamental interest by experts are of the greatest value to the horticultural research worker. All are noted or abstracted elsewhere in this number of *H.A.*]

3447. COLONIAL PRODUCTS ADVISORY BUREAU.
Colonial Plant and Animal Products, 1950, Vol. I, No. I, pp. 1-94.

With the transfer of the scientific and technical staff from the Imperial Institute to the control of the Colonial Office in 1949 the Bulletin of the Imperial Institute has come to an end. In future two journals will take its place, viz., *Colonial plant and animal products* and *Colonial geology and mineral resources.* We welcome the first number of that devoted to agriculture [see also separate abstracts].

Noted.

3448.

a *A.R. Dep. Agric. Basutoland for 1949,* 1950, pp. 36.

b *18th A.R. Eire Minist. Agric., 1948-49,* Dublin, pp. 183+Appendices pp. 85, 5s.

c *88th A.R. St. Bd Agric. Michigan* and *62nd A.R. Michigan agric. Exp. Stat. 1948-49,* 1950, pp. 264.

d *55th and 56th A.R.s Minnesota agric. Exp. Stat. 1947-48* and *1948-49,* pp. 36 each.

e *A.R. North Carolina agric. Ext. Serv., 1949,* pp. 44, illus.

f *Bienn. Rep. Oklahoma agric. Exp. Stat. 1946-48,* Parts I and II, pp. 99 and 31, being *Science serving agriculture,* 1948. Popular notes and lists of staff and publications.